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U. S. NATIONAL MUSEUM.

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# PROCEEDINGS

[illegible]

OF THE

# UNITED STATES NATIONAL MUSEUM.

## Vol. IV.

## 1881.

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PUBLISHED UNDER THE DIRECTION OF THE SMITHSONIAN INSTITUTION.

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PROCEEDINGS

OF THE

UNITED STATES NATIONAL MUSEUM.

1881.

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# CHECK-LIST OF DUPLICATES OF FISHES FROM THE PACIFIC COAST OF NORTH AMERICA, DISTRIBUTED BY THE SMITHSONIAN INSTITUTION IN BEHALF OF THE UNITED STATES NATIONAL MUSEUM, 1881.

Prepared by DAVID S. JORDAN and PIERRE L. JOUY.

## HIPPOCAMPIDÆ.

1. **Hippocampus ingens** Grd.

7404. California.

## SYNGNATHIDÆ.

2. **Siphostoma leptorhynchus**[*] (Grd.) J. & G.

26808. San Diego, California.

3. **Siphostoma californiense** (Storer) J. & G.

26943. Santa Barbara, California.
27050. Monterey, California.
27199. San Francisco, California.
27380. Santa Barbara, California.

## AULORHYNCHIDÆ.

4 **Aulorhynchus flavidus** Gill.

27021. Monterey, California.

## GASTEROSTEIDÆ.

5. **Gasterosteus (aculeatus** var.) **cataphractus**[†] (Pallas) J. & G.

27284. Puget Sound.

6. **Gasterosteus microcephalus** Grd.

7814. San Francisco, California.

## PLEURONECTIDÆ.

7. **Aphoristia atricauda** Jor. & Gilb.

(Types.)

27396. San Diego, California.

8. **Pleuronichthys verticalis** Jor. & Gilb.

(Types.)

26979. Monterey, California.
27230. San Francisco, California.

---

[*] Including *Syngnathus dimidiatus* Gill.

[†] *Gasterosteus serratus* Ayres.

9. **Pleuronichthys decurrens** Jor. & Gilb.

(Types.)

26978. Monterey, California.
27115. San Francisco, California.

10. **Pleuronichthys cœnosus** Grd.

25025. Santa Catalina Island, California.
25049. Wilmington, California.
26769. San Diego, California.
27056. Monterey, California.
27128. San Francisco, California.
27231. " "
27274. Puget Sound.
27298. "

11. **Hypsopsetta guttulata** (Grd.) Gill.

24871. San Diego, California.
24910. " "
26768. " "
26841. San Pedro, California.
26902. Santa Barbara, California.
26938. " "

12. **Cynicoglossus pacificus** Lockington.

27058. Monterey, California.
27228. San Francisco, California.
27302. Puget Sound.

13. **Glyptocephalus zachirus** Lockington.

26985. Monterey, California.
27124. San Francisco, California.
27210. Point Reyes, California.

14. **Pleuronectes stellatus** Pallas.

22683. California.
24163. San Francisco, California.
24164. " "
26915. San Luis Obispo, California.
27059. Monterey, California.
27227. San Francisco, California.
27278. Puget Sound.

15. **Lepidopsetta bilineata** (Ayres) Gill.

27003. Monterey, California.
27117. San Francisco, California.
27299. Puget Sound.

16. **Parophrys ischyrus** Jor. & Gilb.

(Types.)

27266. Puget Sound.

17. **Parophrys isolepis** (Lock.) J. & G.

(Types.)

26982. Monterey, California.
27116. San Francisco, California.
27229. " "
27301. Puget Sound.
27347. "

18. **Parophrys vetulus** Grd.

27057. Monterey, California.
27232. San Francisco, California.
27300. Puget Sound.

19. **Citharichthys sordidus** (Grd.) Gthr.

24168. San Francisco, California.
27002. Monterey, California.
27120. San Francisco, California.
27233. San Francisco, California.
27325. Puget Sound.

20. **Psettichthys melanostictus** Grd.

27000. Monterey, California.
27119. San Francisco, California.
27284. San Francisco, California.
27348. Puget Sound.

21. **Hippoglossoides exilis** Jor. & Gilb

(Types.)

27061. Monterey, California.
27121. San Francisco, California.

**22. Hippoglossoides elassodon** Jor. & Gilb.

(Types.)

27062. Puget Sound.
27263. Puget Sound.

**23. Hippoglossoides jordani** Lockington.

26981. Monterey, California.
27118. San Francisco, California.

**24. Paralichthys maculosus** Grd.

17063. Santa Barbara, California.
24813. San Diego, California.
24874. " "
25079. Santa Barbara, California.
26767. San Diego, California.
26847. San Pedro, California.
26930. Santa Barbara, California.
27060. Monterey, California.
27125. San Francisco, California.

**25. Xystreurys liolepis** Jor. & Gilb.

(Types.)

26884. Santa Barbara, California.

**26. Hippoglossus vulgaris** Flem.

27326. Straits of Fuca. (Skulls.)

**27. Atheresthes stomias** Jor. & Gilb.

(Types.)

27122. Point Reyes, California.
27186. Point Reyes, California.

## GADIDÆ.

**28. Merlucius productus** (Ayres) Gill.

27010. Monterey, California.
27167. San Francisco, California.
27203. San Francisco, California.
27295. Puget Sound.

**29. Pollachius chalcogrammus** (Pallas) J. & G.

27312. Puget Sound.

**30. Gadus morrhua** L.

27318. Puget Sound.

**31. Microgadus proximus** (Grd.) Gill.

24656. San Francisco, California.
27183. " "
27317. Puget Sound.

## BROTULIDÆ.

**32. Brosmophycis marginatus** (Ayres) Gill.

27045. Point Reyes, California.

## OPHIDIIDÆ.

**33. Ophidium taylori** Grd.

7863. California.
27130. San Francisco, California.
27393. Monterey, California.

## CONGROGADIDÆ.

**34. Scytalina cerdale** Jor. & Gilb.

(Types.)

27400. Cape Flattery, Washington Territory.

### ZOARCIDÆ.

35. **Lycodopsis pacificus** Collett.

27143. Point Reyes, California.
27334. Cape Flattery, Washington Territory.

36. **Lycodopsis paucidens**[*] (Lock.) Gill.

27142. Point Reyes, California.

### BLENNIIDÆ.

37. **Anarrhichthys ocellatus** Ayres.

23896. Neah Bay, Washington Territory.
27054. Monterey, California.
27149. San Francisco, California.
27194. San Francisco, California.
27272. Puget Sound.

38. **Lumpenus anguillaris** (Pallas) Gill.

27154. Puget Sound.
27258. Puget Sound.

39. **Xiphister rupestris** Jor. & Gilb.

(Types.)

27001. Monterey, California.
27327. Cape Flattery, Washington Territory.

40. **Xiphister mucosus** (Grd.) Jor.

26999. Monterey, California.
27328. Cape Flattery, Washington Territory.

41. **Xiphister chirus** J. & G.

(Types.)

27175. Monterey, California.
27338. Puget Sound.

42. **Cebedichthys violaceus** Grd.

26998. Monterey, California.
27392. San Francisco, California.

43. **Anoplarchus alectrolophus** (Pallas) J. & G.

27339. Cape Flattery, Washington Territory.

44. **Apodichthys fucorum** Jor. & Gilb.

(Types.)

26994. Monterey, California.

45. **Apodichthys flavidus** Grd.

6674. California.
7334. San Francisco, California.
20328. California.
23408. Neah Bay, Washington Territory.
27163. San Francisco, California.
27193. " "
27335. Cape Flattery, Washington Territory.

46. **Murænoides ornatus**[†] (Grd.) Gill.

27181. Puget Sound.
27192. "
27330. Cape Flattery, Washington Territory.

47. **Cremnobates integripinnis**[‡] Rosa Smith.

20547. San Diego, California.
27404. San Diego, California (types)

48. **Gibbonsia elegans** Cooper.

27037. Monterey, California.
27383. San Diego, California.
27394. Monterey, California.
27416. San Diego, California.

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[*] Perhaps a form of the preceding.

[†] Most of the specimens distributed belong to the form called *Muræenoides lætus* (Cope).

[‡] Probably identical with *Cremnobates monophthalmus* Gthr.

49. **Heterostichus rostratus** Grd.

20670. California.
24996. Wilmington, California.
25019. Santa Catalina Island, California.
25068. Wilmington, California.
26763. San Diego, California.
26890. Santa Barbara, California.
27201. Monterey, California.

50. **Neoclinus blanchardi** Grd.

26883. Santa Barbara, California.
26942. " "
27179. Monterey, California.

51. **Neoclinus satiricus** Grd.

22334. Monterey, California.
27040. Monterey, California.

52. **Hypleurochilus gentilis** (Grd.) Gill.

26917. Santa Barbara, California.

## BATRACHIDÆ.

53. **Porichthys porosissimus** (Cuv. & Val.) Gthr.

26889. Santa Barbara, California.
27009. Monterey, California.
27063. " "
27132. San Francisco, California.
27200. " "
27277. Puget Sound.

## GOBIESOCIDÆ.

54. **Gobiesox reticulatus** Grd.

27012. Monterey, California.
27329. Cape Flattery, Washington Territory.

## LIPARIDIDÆ.

55. **Liparis pulchellus** Ayres.

27081. Monterey, California.

## AGONIDÆ.

56. **Brachyopsis verrucosus** Lockington.

(Types.)

27184. Point Reyes, California.

57. **Brachyopsis xyosternus** J. & G.

(Types.)

27188. Point Reyes, California.
27395. Soquel, California.

58. **Podothecus acipenserinus** (Pallas) Gill.

27332. Cape Flattery, Washington Territory.

## COTTIDÆ.

59. **Ascelichthys rhodorus** J. & G.

(Types.)

27331. Cape Flattery, Washington Territory.

60. **Cottopsis gulosus** Grd.

7817. San Francisco, California.
27390. McCloud River, California.

61. **Cottopsis semiscaber** Cope.

27414. Utah Lake, Utah.

62. **Cottopsis asper** (Rich.) Grd.

3306. Puget Sound.
6052. "
12968. Mare Island, California.
12966. " "
27145. Sacramento River, California.
27268. Puget Sound.
27281. Columbia River.

63. **Cottus polyacanthocephalus** Pallas.

27262. Puget Sound.

64. **Artedius lateralis** Grd.

23407. Neah Bay, Washington Territory.
27337. Cape Flattery, Washington Territory.

65. **Artedius notospilotus** Grd.

25087. Santa Barbara, California.
25082. “ “
26865. Santa Barbara, California.
27146. Puget Sound.

66. **Artedius quadriseriatus** Lockington.

26848. San Francisco, California.
27133. San Francisco, California.

67. **Artedius pugetensis** Steind.

27185. Point Reyes, California.
27238. Straits of Fuca.

68. **Hemilepidotus spinosus** Ayres.

27011. Monterey, California.
27052. “ “
27236. San Francisco, California.
27881. Monterey, California.

69. **Hemilepidotus trachurus*** (Pallas) Gthr.

24672. Neah Bay, Washington Territory.

70. **Aspicottus bison** Grd.

27261. Puget Sound.

71. **Scorpænichthys marmoratus** Grd.

24142. San Francisco, California.
25038. Santa Barbara, California.
25071. “ “
26888. “ “
27058. Monterey, California.
27110. San Francisco, California.
27350. Puget Sound.

72. **Leptocottus armatus** Grd.

24822. San Diego, California.
24862. “ “
24906. “ “
27055. Monterey, California.
27147. San Francisco, California.
27267. Puget Sound.

73. **Liocottus hirundo** Grd.

26887. Santa Barbara, California.

74. **Blennicottus globiceps** (Grd.) Gill.

27336. Cape Flattery, Washington Territory.

75. **Oligocottus maculosus** Grd.

27177. Monterey, California.
27333. Cape Flattery, Washington Territory.

76. **Oligocottus analis** Grd.

26761. San Diego, California.
27051. Monterey, California.
27415. San Diego, California.

77. **Blepsias cirrhosus** (Pallas) Gthr.

27240. Straits of Fuca.

78. **Nautichthys oculofasciatus** Grd.

27239. Straits of Fuca.

## SCORPÆNIDÆ.

79. **Scorpæna guttata** Grd.

24982. Wilmington, California.
24998. “ “
25026. Santa Catalina Island, California.
26861. San Pedro, California.
26879. Santa Barbara, California.

---

* *Hemilepidotus gibbsi* Gill; *Temnistia ventricosa* Rich.

**80. Sebastichthys nigrocinctus** (Ayres) Gill.

26091. Monterey, California.
27285. Puget Sound.

**81. Sebastichthys serriceps** Jor. & Gilb.

(Types.)

25005. San Pedro, California.
26918. Santa Barbara, California.
27041. Monterey, California.
27090. San Francisco, California.

**82. Sebastichthys nebulosus** (Ayres) Gill.

23397. Neah Bay, Washington Territory.
24674. " "
26986. Monterey, California.
27093. San Francisco, California.
27343. Puget Sound.

**83. Sebastichthys chrysomelas** Jor. & Gilb.

(Types.)

25076. Santa Barbara, California.
26880. " "
26934. Santa Barbara, California.
26968. Monterey, California.

**84. Sebastichthys carnatus** Jor. & Gilb.

(Types.)

24144. San Francisco, California.
26993. Monterey, California.
27098. San Francisco, California.

**85. Sebastichthys maliger** Jor. &. Gilb.

(Types.)

2002. Puget Sound.
26970. Monterey, California.
27091. San Francisco, California.
27208. San Francisco, California.
27309. Puget Sound.

**86. Sebastichthys caurinus** (Rich.) J. & G.

27100. Puget Sound.
27294. Puget Sound.

**87. Sebastichthys vexillaris** Jor. & Gilb.

(Types.)

26997. Monterey, California.
27087. San Francisco, California.

**88. Sebastichthys rastrelliger** Jor. & Gilb.

(Types.)

25028. Santa Catalina Island, California.
25058.' San Pedro, California.
26908. Santa Barbara, California.
27033. Monterey, California.
27102. San Francisco, California.

**89. Sebastichthys auriculatus** (Grd.) Gill.

15039. Mouth of Russian River, California.
15040. " "
26904. Santa Barbara, California.
26935. Santa Barbara, California.
27104. San Francisco, California.
27293 (var). Puget Sound.

**90. Sebastichthys rubrivinctus** Jor. & Gilb.

(Types.)

26989. Monterey, California.

**91. Sebastichthys chlorostictus** Jor. & Gilb.

(Types.)

26964. Monterey, California.
27092. San Francisco, California.

**92. Sebastichthys rhodochloris** Jor. & Gilb.

(Types.)

26967. Monterey, California.
27106. San Francisco, California.

### 93. **Sebastichthys rosaceus** (Grd.) Lock.

24148. San Francisco, California.
24657. " "
26961. Monterey, California.
27089. San Francisco, California.
27211. " "

### 94. **Sebastichthys constellatus** Jor. & Gilb.

(Types.)

24147. San Francisco, California.
26963. Monterey, California.
27086. San Francisco, California.

### 95. **Sebastichthys ruber** (Ayres) Lock.

26962. Monterey, California.
27097. San Francisco, California.
27346. Puget Sound.

### 96. **Sebastichthys miniatus** Jor. & Gilb.

(Types.)

26965. Monterey, California.
27213. San Francisco, California.

### 97. **Sebastichthys pinniger** (Gill) Lock.

23398. Neah Bay, Washington Territory.
26966. Monterey, California.
27099. San Francisco, California.
27344. Puget Sound.

### 98. **Sebastichthys atrovirens** Jor. & Gilb.

(Types,)

24994. San Pedro, California.
25010. " "
25052. " "
25054. " "
26870. Santa Barbara, California.
26903. " "
27032. Monterey, California.
27096. San Francisco, California.

### 99. **Sebastichthys elongatus** (Ayres) Gill.

26969. Monterey, California.
27095. San Francisco, California.

### 100. **Sebastichthys proriger** Jor. & Gilb.

(Types.)

24658. San Francisco, California.
26980. Monterey, California.
27105. San Francisco, California.

### 101. **Sebastichthys ovalis** (Ayres) Lock.

27043. Monterey, California.

### 102. **Sebastichthys entomelas** Jor. & Gilb.

(Types.)

27044. Monterey, California.

### 103. **Sebastichthys mystinus** Jor. & Gilb.

(Types.)

26971. Monterey, California.
27081. " "
27085. San Francisco, California

### 104. **Sebastichthys ciliatus*** (Tilesius) J. & G.

27255. Kodiak, Alaska.

### 105. **Sebastichthys melanops** (Grd.) Gill.

24669. Neah Bay, Washington Territory.
27042. Monterey, California.
27088. San Francisco, California.
27319. Puget Sound.

### 106. **Sebastichthys flavidus** (Ayres) Lock.

26984. Monterey, California.
27101. San Francisco, California.

### 107. **Sebastodes paucispinis** (Ayres) Gill.

26950. Santa Barbara, California.
26992. Monterey, California.
27094. San Francisco California.

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* *Perca variabilis* Pallas.

## CHIRIDÆ.

108. **Hexagrammus asper** Steller.

27280. Puget Sound.

109. **Hexagrammus superciliosus** (Pallas) J. & G.

27114. San Francisco, California.

110. **Hexagrammus decagrammus** (Pallas) J. & G.

23400, ♀.* Neah Bay, Washington Territory.
27005, ♀. Monterey, California.
27006, ♂.† " "
27109, ♀. San Francisco, California.
27166, ♂. " "
27214, ♀. San Francisco, California.
27215, ♂. " "
27278, ♂. Puget Sound.
27279, ♀. "
27388, ♀. San Francisco, California.

111. **Ophiodon elongatus** Grd.

6645. California.
6653. "
24169. San Francisco, California.
24670. Neah Bay, Washington Territory.
26890. Santa Barbara, California.
27047. Monterey, California.
27241. San Francisco, California.

112. **Zaniolepis latipinnis** Grd.

27027. Point Reyes, near San Francisco, California

113. **Oxylebius pictus** Gill.

27174. Monterey, California.

114. **Anoplopoma fimbria** (Pallas) Gill.

24655. San Francisco, California.
27128. " "
27282. Puget Sound.

## GOBIIDÆ.

115. **Lepidogobius gracilis** (Grd.) Gill.

27135. San Francisco, California.

116. **Gillichthys mirabilis** Cooper.

26794. San Diego, California.

## LATILIDÆ.

117. **Caulolatilus anomalus**‡ (Cooper) Gill.

24992. Wilmington, California.
25002. " "
25040. " "
26845. San Pedro, California.
26868. Santa Barbara, California.
27069. Monterey, California.

## ICOSTEIDÆ?

118. **Bathymaster signatus** Cope.

27265. Puget Sound.

## POMACENTRIDÆ.

119. **Chromis punctipinnis** Cooper.

24981. Santa Catalina Island, California.
24986. Wilmington, California.
25007. " "
25016. Santa Catalina Island, California.
26871. Santa Barbara, California.

120. **Hypsypops rubicundus** (Grd.) Gill.

17764. San Francisco, California.
24996. Wilmington, California.
25047. Wilmington, California.
26945. Santa Barbara, California.

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* "*Chirus guttatus*" Grd.

† "*Chirus constellatus*" Grd.

‡ Probably identical with *Latilus princeps* Jenyns.

## LABRIDÆ.

121. **Pseudojulis modestus** (Grd.) Gthr.

25080. Santa Catalina Island, California.
25041. Santa Barbara, California.
26882. " "
26937. Santa Barbara, California.
26977. Monterey, California.
27376. Santa Barbara, California.

122. **Platyglossus semicinotus** (Ayres) Gthr.

25001. Wilmington, California.

123. **Pimelometopon pulcher** (Ayres) Gill.

25000. Wilmington, California.
25078. Santa Barbara, California.
26869. Santa Barbara, California.

## EMBIOTOCIDÆ.

124. **Hysterocarpus traski** Gibbons.

27013. Sacramento River, California.

125. **Abeona minima** (Gibbons) Gill.

25085. Santa Barbara, California.
26774. San Diego, California.
26913. Santa Barbara, California.
27029. Monterey, California.
27078. " "

126. **Abeona aurora** Jor. & Gilb.

(Types.)

26996. Monterey, California.
27155. San Francisco, California.

127. **Cymatogaster aggregatus*** Gibbons.

26914. Santa Barbara, California.
27080. Monterey, California.
27165. San Francisco, California.
27243. San Francisco, California.
27296. Puget Sound.

128. **Brachyistius frenatus** Gill.

26891. Santa Barbara, California.
26990. Monterey, California.

129. **Brachyistius rosaceus** Jor. & Gilb.

(Types.)

27170. Point Reyes, California.

130. **Holconotus analis** (A. Agassiz) J. & G.

27075. Monterey, California.

131. **Holconotus argenteus** (Gibbons) J. & G.

24836. San Diego, California.
24914. " "
25065. Santa Barbara, California.
25069. " "
26895. Santa Barbara, California.
26912. " "
27073. Monterey, California.
27158. San Francisco, California.

132. **Holconotus agassizii** (Gill) J. & G.

27076. Monterey, California.
27157. San Francisco, California.

133. **Holconotus rhodoterus**† Ag.

26901. Santa Barbara, California.
26933. " "
27074. Monterey, California.
27156. San Francisco, California.

134. **Amphistichus argenteus** Ag.

24149. San Francisco, California.
25064. Santa Barbara, California.
25077. " "
26885. Santa Barbara, California.
27083. Monterey, California.

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*Nos. 566, 567, 572, 17028, 17029, 17030, 17031, 17032, 17033, and 20340, sent out in previous distributions under the name of "*Holconotus rhodoterus* Ag.," belong to *Cymatogaster aggregatus*.

†See note under *Cymatogaster aggregatus*.

**135. Hypsurus caryi** (L. Agass.) A. Agass.

26896. Santa Barbara, California.
26940. “ “
27017. Monterey, California.
27079. Monterey, California.
27129. San Francisco, California.

**136. Ditrema jacksoni** (Agass.) Gthr.

24157. San Francisco, California.
24835. San Diego, California.
24837. “ “
24963. Wilmington, California.
25011. “ “
25017. Santa Catalina Island, California.
25021. “ “
25034. Santa Barbara California.
27014. Monterey, California.
27242. San Francisco, California.

**137. Ditrema laterale** (Agass.) Gthr.

24151. San Francisco, California.
24152. “ “
27153. “ “
26875. Santa Barbara, California.
27028. Monterey, California
27310. Puget Sound.
27396. “

**138. Ditrema atripes** Jor. & Gilb.

(Types.)

26987. Monterey, California.

**139. Ditrema furcatum** (Grd.) Gthr.

24831. San Diego, California.
26777. “ “
26877. Santa Barbara, California.
26988. Monterey, California.

**140. Damalichthys argyrosomus** (Grd.) J. & G.

6194. Puget Sound.
25067. Santa Barbara, California.
26894. “ “
26954. Santa Barbara, California.
27018. Monterey, California.
27313. Puget Sound.

**141. Rhacochilus toxotes** Ag.

24154. San Francisco, California.
25012. Wilmington, California.
26948. Santa Barbara, California.
26949 (fœtal). Santa Barbara, California.
27015. Monterey, California.

## SCLÆNIDÆ.

**142. Genyonemus lineatus** (Ayres) Gill.

26911. Santa Barbara, California.
26972. Monterey, California.
27152. San Francisco, California.

**143. Corvina saturna** (Grd.) Gthr.

24818. San Diego, California.
25075. Santa Barbara, California.
26759. San Diego, California.
26868. Santa Barbara, California.

**144. Roncador stearnsii** (Steind.) J. & G.

25044. Wilmington, California.
26757. San Diego, California.
26864. Santa Barbara, California

**145. Umbrina xanti** Gill.

26758. San Diego, California.
26849. San Pedro, California.
26872. Santa Barbara, California.

**146. Menticirrus undulatus** (Grd.) Gill.

25073. Santa Barbara, California.
26797. San Diego, California.
26854. San Pedro, California.
26878. Santa Barbara, California.

**147. Cynoscion nobile** (Ayres) J. & G.

26855. San Pedro, California.
26876. Santa Barbara, California.
27070. Monterey, California.

**148. Cynoscion parvipinnis** Ayres.

24817. San Diego, California.
26753. San Diego, California.

**149. Seriphus politus** Ayres.

6657. California.
26804. San Diego, California.
26955. Santa Barbara, California.
27153. San Francisco, California
27195. " "

## PIMELEPTERIDÆ.

**150. Girella nigricans** (Ayres) Gill.

24987. Wilmington, California.
25008. " "
25072. Santa Barbara, California.
26867. Santa Barbara, California.
26956. " "
27384. San Diego, California.

**151. Scorpis californiensis** Steind.

24979. Santa Catalina Island, California.
24984. Wilmington, California.
25009. Wilmington, California.
26850. San Pedro, California.

## PRISTIPOMATIDÆ

**152. Pristipoma davidsoni** Steind.

26853. San Pedro, California.

## SERRANIDÆ.

**153. Serranus clathratus** (Grd.) Steind.

20571. California.
24985. San Pedro, California.
25013. " "
25042. " "
25074. Santa Barbara, California.
26799. San Diego, California.
26851. San Pedro, California.
26886. Santa Barbara, California.
27046. Monterey, California.

**154. Serranus nebulifer** (Grd.) Steind

26754. San Diego, California.

**155. Serranus maculofasciatus** Steind.

24819. San Diego, California.
26755. San Diego, California.

## CENTRARCHIDÆ.

**156. Archoplites interruptus** (Grd.) Gill.

27020. Sacramento River, California.
27137. Sacramento River, California.

## STROMATEIDÆ.

**157. Stromateus simillimus** (Ayres) Gill.

26800. San Diego, California.
26910. Santa Barbara, California.
26959. " "
27077. Monterey, California,
27162. San Francisco, California.

## CARANGIDÆ.

**158. Trachurus plumieri** (Lac.) J. & G.

26838. San Pedro California.
26909. Santa Barbara, California.
27377. Santa Barbara, California.

**159. Seriola lalandi** Cuv. & Val.

26835. San Pedro, California.

## SCOMBRIDÆ.

**160. Orcynus alalonga** (Gmelin) Risso.

26873. Santa Barbara, California.

**161. Sarda chilensis** (C. & V.) J. & G.

25031. San Diego, California.
26874. Santa Barbara, California.

**162. Scomberomorus concolor** (Lock.) J. & G.

27205. Soquel, California.

### AMMODYTIDÆ.

**163. Ammodytes personatus** Grd.

27025. Monterey, California.
27084. Monterey, California.

### SPHYRÆNIDÆ.

**164. Sphyræna argentea** Grd.

25003. San Pedro, California.
26900. Santa Barbara, California.
26939. Santa Barbara, California.
27379. " "

### ATHERINIDÆ.

**165. Atherinopsis californiensis** Grd.

24132. San Francisco, California.
24869. San Diego, California.
26764. San Diego, California.
26922. Santa Barbara, California.

**166. Atherinops affinis** (Ayres) Steind.

25006. Wilmington, California.
25035. Santa Barbara, California.
25083. Santa Barbara, California.
27202. San Francisco, California.

**166. Leuresthes tenuis** (Ayres) J. & G.

26766. San Diego, California.

### MUGILIDÆ.

**168. Mugil mexicanus** Steind.

24827. San Diego, California.
24888. " "
26796. " "
26924. Santa Barbara, California.
27148. San Francisco, California.

### SCOMBRESOCIDÆ.

**169. Tylosurus exilis** (Grd.) J. & G.

26756. San Diego, California.

**170. Scombresox brevirostris** Peters.

8885. Monterey Bay, California.

**171. Hemirhamphus rosæ** Jor. & Gilb.

(Types.)

24917. San Diego, California.
26790. San Diego, California.

**172. Exocœtus californicus** Cooper.

26832. San Pedro, California.
26907. Santa Barbara, California.

### CYPRINODONTIDÆ.

**173. Cyprinodon californiensis** Grd.

27373. San Diego, California.

**174. Fundulus parvipinnis** Grd.

26941. Santa Barbara, California.

### SCOPELIDÆ.

**175. Synodus lucioceps** (Ayres) Gill.

26881. Santa Barbara, California.
27072. Monterey, California.
27182. San Francisco, California.

## SALMONIDÆ.

176. **Osmerus thaleichthys** Ayres.

27019. Monterey, California.
27136. San Francisco, California.

177. **Osmerus attenuatus** Lockington.

27204. San Francisco, California.

178. **Hypomesus olidus** (Pallas) Gill.

27150. San Francisco, California.
27276. Puget Sound.

179. **Thaleichthys pacificus** (Rich.) Grd.

20567. Columbia River, Oregon.
27297. Fraser's River, British Columbia.

180. **Salvelinus malma** (Walb.) J. & G.

27264. Puget Sound.

181. **Salmo purpuratus** Pallas (*Salmo clarki* Rich.).

27259. Puget Sound.
27360. Utah Lake, Utah.

182. **Salmo purpuratus**, subsp. **henshawi** Gill & Jordan.

24139. Lake Tahoe.

183. **Salmo irideus** Ayres.

26795. San Luis River, California.
27207. Sacramento River, California.
27856. Monterey, California.

184. **Salmo gairdneri** Rich.

27218. Columbia River.

185. **Oncorhynchus keta** (Walbaum) Gill & Jor.

24673. Neah Bay, Washington Territory.
27220. San Francisco, California.
27288. Fraser's River, British Columbia.

186. **Oncorhynchus kisutch** (Walb.) Jor. & Gilb.

27066. Puget Sound.
27250. Sacramento River, California.
27260. Puget Sound.
27280. Fraser's River, British Columbia.
27315. Puget Sound.

187. **Oncorhynchus chouicha** (Walb.) Jor. & Gilb. (*Salmo quinnat* Rich.).

27039. Monterey, California.
27067. " "
27217. " "
27237. Sacramento River.
27275. Puget Sound.
27287. Frazer's River, British Columbia.
27304. Columbia River.
27316. Puget Sound.

188. **Oncorhynchus nerka** (Walb.) Gill & Jor.

27303. Columbia River.

## ENGRAULIDIDÆ.

189. **Stolephorus ringens** (Jenyns) J & G.

24824. San Diego, California.
24919. " "
26784. " "
26958. Santa Barbara, California.
27187. San Francisco, California.

190. **Stolephorus delicatissimus** (Grd.) J. & G.

24870. San Diego, California.
26786. San Diego, California.

191. **Stolephorus compressus** (Grd.) J. & G.

26785. San Diego, California.
26862. San Pedro, California.

## CLUPEIDÆ.

192. **Clupea sagax** Jenyns.

24820. San Diego, California.
24857. " "
24886. " "
26957. Santa Barbara, California.
27140. San Francisco, California.
27378. Santa Barbara, California.

193. **Clupea mirabilis** Grd.

24865. San Diego, California.
27351. Puget Sound.

## ALBULIDÆ.

194. **Albula vulpes** (L.) Goode.

26789. San Diego, California.

## CYPRINIDÆ.

195. **Orthodon microlepidotus** (Ayres) Grd.

2042. Puget Sound.
27139. Sacramento River.

196. **Alburnus balteatus** (Rich.) Jor.

2082. Puget Sound.
27341. Fraser's River, British Columbia.

197. **Squalius gibbosus** (Ayres) J. & G. (*Siboma crassicauda* Grd.).

27141. Sacramento River, California.

198. **Squalius atrarius** (Grd.) Jor.

27407. Utah Lake, Utah.

199. **Squalius rhomaleus** Jor. & Gilb.

(Types.)

27364. Utah Lake, Utah.

200. **Squalius cruoreus** Jor. & Gilb.

(Types.)

27408. Utah Lake, Utah.

201. **Squalius copei** Jor. & Gilb.

(Types.)

27409. Bear River, Evanston, Wyoming.

202. **Squalius aliciæ** Jouy.

(Types.

27412. Utah Lake, Utah.

203. **Squalius tænia** (Cope) Jor.

27410. Utah Lake, Utah.

204. **Squalius montanus** (Cope) Jor.

27411. Utah Lake, Utah.

205. **Ptychochilus oregonensis** (Rich.) Ag.

24128. Sacramento River, California.
27244. " "
27291. Columbia River, Oregon.
27352. Columbia River, Oregon.
27389. Puget Sound.

206. **Ptychochilus harfordi** Jor. & Gilb.

(Types.)

27246. Sacramento River, California.

207. **Apocope vulnerata** Cope.

27413. Utah Lake, Utah.

**208. Pogonichthys macrolepidotus (Ayres) J. & G.**

27134. Sacramento River, California.

**209. Mylochilus caurinus** (Rich.) Ag.

27271. Puget Sound.
27283. Columbia River.
27842. Frazer's River, British Columbia.

**210. Mylopharodon conocephalus** Ayres.

27245. Sacramento River, California.

## CATOSTOMIDÆ.

**211. Chasmistes liorus** Jor. & Gilb.

27361. Utah Lake, Utah.

**212. Catostomus fecundus** Cope & Yarrow.

27362. Utah Lake, Utah.

**213. Catostomus ardens** Jor. & Gilb.

(Types.)

27363. Utah Lake, Utah.

**214. Catostomus occidentalis** Ayres.

27131. Sacramento River, California.

**215. Catostomus macrochilus** Grd.

27290. Columbia River.

## SILURIDÆ.

**216. Amiurus catus** (L.) Gill.

27144. Sacramento River, California (introduced).

## MURÆNIDÆ.

**217. Muræna mordax** Ayres.

24991. Wilmington, California.
25004. " "
25022. Santa Catalina Island, California.
26901. San Diego, California.

## ACIPENSERIDÆ.

**218. Acipenser transmontanus** Rich.

27065. Sacramento River, California.
27269. Frazer's River, British Columbia.

**219. Acipenser medirostris** Ayres.

27223. San Francisco, California.

## CHIMÆRIDÆ.

**220. Chimæra colliæi** Bennett.

26976. Monterey, California.
27226. San Francisco, California.
27311. Puget Sound

## MYLIOBATIDÆ.

**221. Myliobatis californicus** Gill.

24815. San Diego, California.
26781. " "
26840. San Pedro, California.
26892. Santa Barbara, California.
27256. San Francisco, California.

## TRYGONIDÆ.

**222. Pteroplatea marmorata** Cooper.

26770. San Diego, California.
26929. Santa Barbara, California.

**223. Dasybatus dipterurus** Jor & Gilb.

(Types.)

26782. San Diego, California.

**224. Urolophus halleri** Cooper.

24834. San Diego, California.
25024. San Pedro, California.
26788. San Diego, California.
26834. San Pedro, California.
20925. Santa Barbara, California.

## RAIIDÆ.

**225. Raia binoculata** Girard (*Raia cooperi* Girard).

21583. Washington Territory.
27159. San Francisco, California.
27257. Puget Sound.

**226. Raia rhina** Jor. & Gilb.

(Types.)

27007. Monterey, California.
27292. Puget Sound.

**227. Raia inornata** Jor. & Gilb.

(Types.)

24161. San Francisco, California.
26974. Monterey, California.
27216. San Francisco, California.
27252 (egg). " "

**228. Raia inornata** subsp. **inermis** Jor. & Gilb.

(Types.)

26926. Santa Barbara, California.

**229. Raia stellulata** Jor. & Gilb.

(Types.)

26975. Monterey, California.

## RHINOBATIDÆ.

**230. Zapteryx exasperatus** Jor. & Gilb.

(Types.)

25050. San Diego, California.

**231. Rhinobatus triseriatus** Jor. & Gilb.

(Types.)

26773. San Diego, California.
26836. San Pedro, California.
26893. Santa Barbara, California.

**232. Rhinobatus productus** Ayres.

24826. San Diego, California.
26772. " "
26852. San Pedro, California.
26905. Santa Barbara, California.

## TORPEDINIDÆ.

**233. Torpedo californica** Ayres.

27212. Soquel, California (Monterey Bay).

## SQUATINIDÆ.

**234. Squatina angelus** Duméril.

26920. Santa Barbara, California.

### SPINACIDÆ.

235. **Squalus acanthias** L.

2638. California.
6675. "
27305. Puget Sound.

### CESTRACIONTIDÆ.

236. **Heterodontus francisci** (Grd.) Gill.

24816. San Diego, California.
24997. Wilmington, California.
25020. Santa Catalina Island, California.
26760. San Diego, California.
26803 (eggs). San Diego, California.
26846. San Pedro, California.
26928. Santa Barbara, California.

### NOTIDANIDÆ.

237. **Notorhynchus maculatus** Ayres.

27191. Humboldt Bay.

238. **Hexanchus corinus** Jor. & Gilb.

(Types.)

27196. Soquel, California.

### SCYLLIIDÆ.

239. **Catulus ventriosus** (Garman) J. & G.

25027. Santa Catalina Island, California.
25055. Santa Barbara, California.
25062. " "
25084. " "
26866. Santa Barbara, California.
20951 (egg). " "
27251. Soquel, California.

### GALEORHINIDÆ.

240. **Mustelus hinnulus** (Blainv.) J. & G.

24838. San Diego, California.
26771. " "
26856. San Pedro, California.
26906. Santa Barbara, California.

241. **Rhinotriacis henlei** Gill.

27026. Monterey, California.
27180. San Francisco, California.

242. **Triacis semifasciatus** Grd.

25039. Santa Barbara, California.
25081. " "
26921. Santa Barbara, California

243. **Galeorhinus galeus** (L.) Blainv.

26927. Santa Barbara, California.
26973. Monterey, California.
27190. San Francisco, California.
27391 " "

### CETORHINIDÆ.

244. **Cetorhinus maximus** (L.) Blainv.

27024. (Teeth and gill-rakers). Monterey, California.

### MYXINIDÆ.

245. **Polistotrema dombeyi** (Müller) Gill.

26995. Monterey, California.

UNITED STATES NATIONAL MUSEUM, *January* 14, 1881.

## DESCRIPTION OF A NEW SPECIES OF SQUALIUS (SQUALIUS ALICIÆ), FROM UTAH LAKE.

### By PIERRE LOUIS JOUY.

**Squalius aliciæ**, sp. nov.

Allied to *Tigoma intermedia* Girard.

Body elongate, compressed posteriorly, the back gradually elevated from the snout to the dorsal. Dorsal and ventral outline similar. Greatest depth of body (at ventrals) equal to length of head. Lateral line complete, slightly decurved.

Head short, rather stout, its breadth equalling three-fifths its length, which is 4⅛ in the total without caudal. Snout rounded, jaws equal, maxillaries reaching to the vertical from the anterior margin of the orbit.

Eye moderate, its diameter contained four times in the length of the head. Scales minute, 18–80–15, of about equal size. The pectoral fin does not reach to the ventral, and equals the length of the head.

*Measurements.*—Length to base of caudal, .067$^{mm}$; head, .016$^{mm}$; depth at ventrals, .016$^{mm}$; diameter of orbit, .004$^{mm}$; mandible, .005$^{mm}$; interorbital space, .0055$^{mm}$; breadth of head, .009$^{mm}$; pectoral, .016$^{mm}$; longest dorsal ray, .014$^{mm}$; longest ventral ray, .010$^{mm}$; longest anal ray, .011$^{mm}$. Caudal broken.

Radial formulæ: D. I, 8; A. I, 8; V. I, 7; P. 15.

Teeth, 2, 4–5, 1; strongly hooked, apparently without masticatory surface.

Color dark plumbeous above, with a median band of steel-blue extending along the sides of the body from the head to the caudal fin. Below the lateral line pinkish; cheeks silvery.

Five specimens, collected in Utah Lake by Prof. D. S. Jordan, are numbered in the United States National Museum 27412.

UNITED STATES NATIONAL MUSEUM, *January* 14, 1881.

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## DESCRIPTION OF A NEW GOBIOID FISH (OTHONOPS EOS), FROM SAN DIEGO, CALIFORNIA.

### By ROSA SMITH.

**Othonops eos**, gen. et sp. nov.

One specimen of this interesting fish was collected for me by Mr. G. W. Dunn at Point Loma, San Diego County, California. It is found under large stones, and is of a bright pink color in life, fading to a dull yellowish white in spirits. This species is most closely related to *Crystallogobius nilssoni* (Düb. & Kor.) Gill (*Gobiosoma nilssoni* Günther, Cat. Fishes Brit. Mus. iii, 86), a species found on the coast of Norway, from which it is distinguished generically by the obsolete eyes, and specifically by the characters given in the following description:

Body elongate, posteriorly much compressed, not much depressed anteriorly. Head depressed, with the cleft of the mouth nearly horizontal and one-half the length of the head, the maxillary reaching a vertical line drown across the probable position of the eye. Eyes invisible, covered by the skin; snout rounded; the jaws equal, or very nearly so, the lower jaw in a preserved specimen seeming to be very slightly produced. Both nostrils are provided with a flap.

A narrow band of villiform teeth in each jaw. The gill-membrane is united to the isthmus, and the branchial cleft is equal in length to the distance between the first and second dorsal fins, or one-tenth of the length (from snout to base of caudal).

A groove has its origin immediately in advance of first dorsal and extends medially nearly to tip of snout.

The first dorsal fin is composed of two flexible spines, and is equidistant between the snout and the base of the caudal fin; the insertion of the second dorsal is not much in advance of vent, while the insertion of the anal is opposite the fifth ray of the soft dorsal; the last rays of the posterior dorsal are slightly longer than its anterior one, and the fin terminates opposite the anal, which is similar to the soft dorsal. A very small anal papilla may be seen.

Vertical fins low; caudal small, pointed; ventrals forming a disk, which is not adherent to the belly; pectorals like the caudal in form, their free tips extending beyond the ventrals, though not approximating the first dorsal, and very remote from the vent.

Body entirely smooth, wholly free from scales, tubercles, or asperities of any kind.

The type specimen has been presented to the National Museum, where it is numbered 27466.

This species is doubtless the type of a distinct genus, which may be called *Othonops* (ὀϑόνη, veil; ὤψ, eye). This genus is distinguished from *Crystallogobius* by the concealed eyes, these organs being large and conspicuous in *C. nilssoni*, and possibly also by the absence of the sexual differences in dentition, so marked in *Crystallogobius*, the male of *C. nilssoni* being provided with strong canines. The remaining genera of *Gobiinæ* have five or more dorsal spines, except *Benthophilus*, which, with three dorsal spines, has the skin verrucose.

Since the above was in type three more specimens have been obtained at the same locality, the measurements of the largest of which are included in the table below.

On examination of this specimen, 2¾ inches in length, I find further characteristics.

In this example, the fins are better preserved and show their normal form, the caudal and pectoral being rounded, the pointed appearance of those fins on the type specimen probably having been caused by their becoming shrivelled and dry before immersion in alcohol, the present individual having been placed in spirits when alive.

On the under side of the head the skin (in a preserved specimen) lies in irregular folds, which conform generally to the outline of the lower jaw, the outer folds reaching the gill-opening. Between the lower lip and these folds there is a series of papillæ, which has its origin a short distance behind the corner of the mouth, the series being slightly separated close behind the symphysis of lower jaw by two small, rounded flaps. The papillæ number about fourteen on either side of the flaps. On the superior surface of the snout, extending posteriorly half as far as the termination of the maxillary, the skin is finely wrinkled, and there is on either side a conspicuous flap, which seems to conceal a nostril.

The skin on the top of the head posterior to the wrinkled snout is smooth and adherent to the muscles. Cheeks tumid.

This species has the habit of burrowing into the sand on the removal of the stone covering it, and in one instance a lively individual buried itself in the sand a second time. It is of a clear pink color, shading into yellow on the tail, and has a semi-transparent appearance in life.

*Measurements.*

| Locality | Point Loma, San Diego, Cal. | | Point Loma, San Diego, Cal. | |
|---|---|---|---|---|
| | Inches and 100ths. | 100ths of length. | Inches and 100ths. | 100ths of length. |
| Extreme length | 2.25 | ........ | 2.75 | ........ |
| Length to base of caudal fin | 2.00 | 100 | 2.38 | ........ |
| Body: | | | | |
| Greatest height | ........ | 19 | ........ | 22 |
| Greatest width | ........ | 18 | ........ | 15 |
| Greatest circumference | ........ | 48 | ........ | 60 |
| Height at base of ventrals | ........ | 14 | ........ | 17 |
| Least height of caudal peduncle | ........ | 10 | ........ | 9½ |
| Length of caudal peduncle | ........ | 10 | ........ | 6 |
| Head: | | | | |
| Greatest length | ........ | 28 | ........ | 27 |
| Greatest width | ........ | 17 | ........ | 18 |
| Width of interorbital area (*ca.*) | ........ | 13.5 | ........ | ........ |
| Branchial cleft | ........ | 10 | ........ | ........ |
| Distance from snout to probable location of eyes | ........ | 12 | ........ | ........ |
| Dorsal: | | | | |
| Distance from snout | ........ | 50 | ........ | 50 |
| Height at last spine | ........ | 10 | ........ | ........ |
| Length of base | ........ | 23.5 | ........ | 23 |
| Anal: | | | | |
| Distance from snout | ........ | 70 | ........ | 74 |
| Length of base | ........ | 16 | ........ | ........ |
| Caudal: | | | | |
| Length of middle rays | ........ | 17 | ........ | 15 |
| Pectoral: | | | | |
| Distance from snout | ........ | 32 | ........ | 30 |
| Length | ........ | 14 | ........ | 15½ |
| Ventral: | | | | |
| Distance from snout | ........ | 29 | ........ | 26 |
| Length | ........ | 14 | ........ | 18 |
| Dorsal | ........ | II, 11 | ........ | ........ |
| Anal | ........ | 6 or 7 | ........ | ........ |

SAN DIEGO, CAL., *January* 18, 1881.

## ON A DUCK NEW TO THE NORTH AMERICAN FAUNA.

### By ROBERT RIDGWAY.

About nine years since (February 2, 1872), Mr. George A. Boardman, of Calais, Maine, sent to the Smithsonian Institution a mounted specimen of a duck obtained in Fulton Market, New York City, and supposed to have been shot on Long Island Sound, which he was unable to determine satisfactorily, but which he supposed to be a hybrid between the Redhead (*Æthyia americana*) and some other species. The specimen was in immature plumage, with the feathers of the first livery much worn, while those of the new moult, which were generally interspersed, indicated a very different garb when the moult should have been completed. At the time the specimen was received at the Smithsonian, I (also supposing it to be a hybrid) made comparisons with nearly, if not quite, all the American species of ducks, but was unable to get the slightest clue to its parentage. It was then put back in the case and not again thought of until a few days ago, when in removing the specimens with a view to their rearrangement I happened to take the one in question in one hand and an adult female of the European Rufous-crested Duck (*Fuligula rufina*) in the other; and having the two thus in a very favorable position for comparison, I at once perceived a striking similarity in general appearance and in the form of the bill, which induced me to extend the examination to an adult male, the result being that no question remained of the bird in question being an immature male of *F. rufina*, a species hitherto not detected in North America. I have written to Mr. Boardman requesting full particulars as to circumstances and date of capture, but have been unable to elicit any further particulars than those given above.

As the species has never been described in any work on North American birds, I give below a description of the three stages represented in the collection of the United States National Museum, as well as of the downy young, the latter quoted from Dresser's "Birds of Europe"; also, the principal synonyms and references, compiled from the leading European authorities.

### Genus FULIGULA, Stephens.*

"*Branta,*" BOIE, Isis, 1822, 564 (type *Anas rufina*, Pall.); not of SCOPOLI, 1769.
*Fuligula*, STEPHENS, Gen. Zoöl. xii. 1824, 187 (type *Anas rufina*, Pall.).
*Netta*, KAUP, Nat. Syst. 1829, 102 (same type).
*Callichen*, BREHM, Vög. Deutschl. 1831, 921 (same type).
*Mergoides*, EYTON, Cat. Brit. B. 1836, 57 (same type).

CHAR.—Similar to *Fulix*, but the bill decidedly broader at the base than at any other part, gradually narrowing toward the end, which has

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*Some recent authorities have, with apparently a not very particular regard for structural characters, used the generic term *Fuligula* for the entire group of lobe-halluxed river-ducks, or those which have usually been assigned to the genera *Fuligula*, *Fulix*, and *Æthyia*. But *Anas rufina*, Pall., upon which the genus *Fuligula* of Stephens a large and very broad nail; maxilla very much depressed terminally, its depth at the base of the nail being only about one-fourth that at the extreme base. Male with the head rufous, the pileum ornamented with a very full, soft tuft or bushy crest, occupying the whole top of the head.

### FULIGULA RUFINA (Pall.) Stephens.

*The Rufous-crested Duck.*

*Anas rufina*, PALL. It. ii. App. 1773, 731, No. 28.—GMEL. S. N. i. 1788, 541.
  *Branta rufina*, BOIE, Isis, 1822, 564.—GRAY, Cat. Brit. B. 1863, 198.
  *Fuligula rufina*, STEPH. Gen. Zoöl. xii. 1824, 188.—DRESSER, B. Eur. pt. xxii. Oct. 1873.
  *Netta rufina*, KAUP, Nat. Syst. 1829, 102.
  *Platypus rufinus*, BREHM, Vög. Deutschl. 1831, 922.
  *Callichen rufinus*, BREHM, t. c. 924.
  *Mergoides rufina*, EYT. Rar. Brit. B. 1836, 57.
  *Aythya rufina*, MACGILL. Man. Brit. B. 1846, 191.
*Callichen ruficeps*, BREHM, t. c. 922.
*Callichen subrufinus*, BREHM, t. c. 924.
*Callichen micropus*, BREHM, t. c. 925.
*Callichen rufescens*, BREHM, Vogelfang, 1855, 379.
*Red-crested Pochard*, SELBY, Brit. Orn. ii. 350.—DRESSER, *l. c.*
*Red-crested Whistling Duck*, YARRELL, Brit. B. ed. 2, iii. 327, fig.; ed. 3, iii. 329, fig.—GRAY, *l. c.*

HAB.—Southern and eastern Europe, northern Africa, and India; occasional in northern and central Europe, and casual in the British Islands; accidental in eastern U. S. (New York market, Boardman; spec. in U. S. Nat. Mus.).

*Adult* ♂ (57207, U. S. Nat. Mus.; Hungary, W. Schlüter).—Head and upper half of the neck delicate pinkish cinnamon, or vinaceous-rufous, the full, soft crest (occupying the entire pileum) paler and less reddish, the feathers light buff at tips; lower half of the neck (including a narrow stripe which extends up the nape to the occiput), jugulum, breast, abdomen, anal region, crissum, upper tail-coverts, and rump brownish black, deepest on the neck and jugulum, and with a decided dark-green gloss on the upper tail-coverts. Back and scapulars uniform light umber-drab or isabella-color; wing-coverts and tertials brownish gray; speculum white basally, changing gradually into pale grayish, then succeeded by a rather broad subterminal bar of dusky, the tip narrowly and abruptly white; four outer primaries with outer ends dusky; inner quills pale ashy, with broad dusky ends; tail dull dark grayish. A broad bar or transverse patch across anterior scapular region, anterior border of the wing, lining of the wing, axillars, and a very large patch

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was based, is quite a different type from *Fulix* (formally restricted to *F. marila* and its allies by Professor Baird, in 1858) and *Æthyia*, and should, in my opinion, be separated generically. The first use of the term *Branta* in a generic sense was by Scopoli in 1769 (for *Anser bernicla*, L., *A. moschata*, L., *A. torrita*, L., *A. albifrons*, L.—a very heterogeneous assemblage, which invalidates its subsequent employment unless restricted to one or another of the species named by Scopoli not already been supplied with a generic name, of which, however, there appears to be none not thus provided.

covering the flanks and posterior half of the sides, pure white. "Bill bright vermilion-red, the tip white; irides reddish brown; legs orange-red. Total length 21 inches." (DRESSER, B. Eur. pt. xxii.) Wing, 10.20; culmen, 2.00; tarsus, 1.50; middle toe, 2.25.

*Adult* ♀ (57209, U. S. Nat. Mus.; Hungary, W. Schlüter).—Crest much less developed than in the male, light hair-brown, this color descending to the level of the lower border of the eye, and posteriorly continuing in a narrow stripe down the nape; rest of the head and neck very pale ashy, as are also the lower parts in general; jugulum, sides, and flanks light raw-umber brown, the tips of the feathers lighter; anal region and crissum uniform light drab, the latter whitish terminally. Upper parts in general umber-drab (the wings being more brownish than in the ♂), darker on the rump; white patch at base of scapular region wholly obsolete, and white border to the wing indistinct; speculum pale ashy, becoming gradually dull white basally, and brownish dusky subterminally, and with a narrow white terminal margin as in the ♂. "Eyes hazel; beak blackish, with a pink tip, a portion of the lower mandible being yellowish pink; legs and feet pinkish, webs blackish." (DRESSER, *l. c.*) Wing, 9.90; culmen, 1.90; tarsus, 1.50; middle toe, 2.20.

*Immature* ♂ (61957, U. S. Nat. Mus.; vicinity of New York City, Feb., 1872, G. A. Boardman).—Similar in general appearance to the adult ♀, as described above, but crest much less developed (the tips of the feathers much worn) and decidedly more reddish in color; sides and under parts of head thickly interspersed with cinnamon-colored feathers (new moult); the jugulum, breast, and posterior under parts also mixed with black feathers, indicating the approaching adult livery; white patch at base of scapular region plainly indicated, and broad white border to anterior portion of the wing very distinct; speculum much as in the ♀, lacking the distinct subterminal dusky bar of the adult ♂. Wing, 9.80; culmen, 1.80; tarsus, 1.50; middle toe, 2.15.

"*Young in down* (fide *Baldamus*, Cab. Journ. 1870, 280).—Differs from every other duck in this plumage that I know in having a double olive-gray stripe from the lores, dividing before the eye, and bordering the yellowish-gray eyebrow above and the cheeks and auriculars below; upper parts, crown from the base of the bill, nape, back, and wings dull olive-gray, excepting the spot on the shoulder, which, with the rest of the body, is pale yellowish gray; iris dark brown; bill reddish brown, with the nail white; feet ash-gray, with a greenish tinge, webs and toes narrowly edged with yellowish white." (DRESSER, *l. c.*)

## ON AMAZILIA YUCATANENSIS (CABOT) AND A. CERVINIVENTRIS, GOULD.

### By ROBERT RIDGWAY.

In compiling the synonymy of *Amazilia cerviniventris*, in volume i of these Proceedings (pp. 148, 149), I united this species with *A. yucatanensis* (Cabot), on the strength of Mr. D. G. Elliot's opinion (see note on p. 149) that they were the same. The editors of "The Ibis," however, in that journal for April, 1879, p. 208, dissent from this determination, and suggest that "a comparison of the Texan specimens with Mexican examples of *A. cerviniventris* and this type [Cabot's type of *yucatanensis*] would be satisfactory, as Mr. Gould has always asserted that *A. yucatanensis* and *A. cerviniventris* are distinct species". Through Dr. Cabot's kindness I have been able to make a direct comparison of his type of *yucatanensis* and the Texan specimens, so called by me, and find that they are indeed quite distinct species, the latter being *A. cerviniventris* of Gould, and exactly like examples of that species from eastern Mexico.

*A. yucatanensis* is much darker colored throughout than *A. cerviniventris*, the green above inclining decidedly to coppery bronze, while the broad tips and margins to the rectrices are deep violet-dusky, instead of greenish or bronzy, little, if any, tinged with violet. The most important difference, however, consists in the coloration of the lower parts, the green of the jugulum ending very abruptly or giving place immediately to the deep cinnamon-rufous of the entire under surface, excepting the femoral tufts, which are white, as in other species of the genus. In *A. cerviniventris*, on the other hand, the green of the jugulum invades both the breast and sides, in the form of a more or less distinct spotting (which, however, grows gradually fainter posteriorly), the feathers of the breast and sides being light green bordered with pale cinnamon. The cinnamon-color of the belly, etc., is also very much paler than in *A. yucatanensis*, in which the tint is even rather deeper than in *A. cinnamomea*.

The following comparative diagnoses express more succinctly the differential characters of the two species:

A. YUCATANENSIS.—Above greenish bronze, changing to coppery; ends and edges of rectrices dark violet-dusky; green of the jugulum giving way immediately and very abruptly to the deep cinnamon-rufous of the breast, sides, etc.

A. CERVINIVENTRIS.—Above metallic grass-green, varying to bronze-green in certain lights; ends and edges of rectrices greenish bronze, or dull bronze, rarely tinged with violet; green of the jugulum invading the breast and sides, in the form of more or less distinct spots, growing gradually fainter posteriorly, the remainder of the under parts much paler cinnamon.

The measurements of the two species appear to vary but little, the four examples of *A. cerviniventris* now before me ranging in length of wing from 2.15 to 2.30 inches, while the type of *A. yucatanensis* measures 2.20; the length of tail in the latter is 1.60, and in the former series varies from 1.50 to 1.70. The culmen ranges from .70 to .80 in *cerviniventris*, but the bill of the type of *yucatanensis* is unfortunately broken, so that its length cannot be ascertained.

*A. cerviniventris* appears to be exclusively an eastern species (as are also *A. yucatanensis* and *A. fuscicaudata*), its habitat extending from southeastern Texas to Vera Cruz, and perhaps also to Yucatan, since Mr. Elliot (Synopsis, p. 219) states that he "can perceive no difference between Mexican and Yucatan specimens". The *A. cinnamomea* appears to be wanting from eastern Mexico, but in the collection of the National Museum are specimens from Mazatlan, Tehuantepec, and Yucatan, besides San Salvador and Nicaragua, though Mr. Elliot gives only "Guatemala and Costa Rica" as its habitat.

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## DESCRIPTIONS OF NEW SPECIES OF FISHES (URANIDEA MARGINATA, POTAMOCOTTUS BENDIREI) AND OF MYCTOPHUM CRENULARE J. AND G.

### By TARLETON H. BEAN.

The first two species here mentioned as undescribed formed part of a collection received from Capt. Charles Bendire, U. S. A. Several other species received at the same time are retained for study and comparison with fuller material promised from the same source.

The *Myctophum* was obtained by Mr. W. H. Dall, in the Pacific, off Puget Sound.

**Uranidea marginata, n. s.**

24197; 9 specimens; tributaries of Walla Walla River; Capt. Charles Bendire, U. S. A.

B. VI; D. VII–VIII, 18–19; A. 15–14 †; V. I, 3; P. 13–14; C. 14–15.

This species is allied to *Cottus cognatus* Rich., but differs from that species in having the vent nearer to the insertion of the caudal than to the snout, while the origin of the anal falls in the vertical from the third dorsal ray instead of the sixth, as in Richardson's species. The ventral has 1 spine and 3 rays (*C. cognatus* has 1 spine and 4 rays). The longest pectoral rays are shorter than the head (equal to the head in *cognatus*).

Head broad, slightly depressed, its greatest length contained a little more than 3 times in length of body without caudal (4 times in total length); distance from tip of snout to eye equals length of eye, which is ¼ of length of head. Vomerine teeth; none on the palatines. Body stout anteriorly, moderately compressed posteriorly, its height at origin of first dorsal equal to its width at the same place, and contained 4½ times in length of body without caudal; the least width of the caudal peduncle less than ½ its height. The distance between the eyes equals ½ of their long diameter. The maxilla extends to the vertical through the end of the anterior third of the orbit. The preoperculum has a short, broad, rather blunt spine at its angle and a much smaller one on its lower limb; between these two the margin in some specimens is crenulated, sometimes forming an additional blunt spine. The preopercular spines are all hidden under the skin.

The distance of the first dorsal from the snout is contained 2⅔ times in length of body without caudal; its longest spine is ⅓ as long as the head; the length of its base is contained 5 times in length of body without caudal, 6 times in total length; the length of the second dorsal base is ⅓ of total length. The length of the anal base is ⅓ of length without caudal. The length of the ventral is contained from 6 to 6½ times in the total length. The length of the pectoral is ¼ of length of body without caudal.

The colors have faded, but the ground color seems to be plumbeous, with occasional blotches of darker. The fins are more or less distinctly punctulated. The first dorsal is darker than the body and has a distinct white margin.

**Potamocottus Bendirei**, n. s.

The type of this species, catalogue No. 24196, was collected by Capt. Charles Bendire, U. S. A., in Rattlesnake Creek, near Camp Harney, Oregon, May 2, 1878. I take pleasure in dedicating the species to this excellent collector and observer, who has contributed so much to the Museum.

DESCRIPTION.—The length of the type is 2.7 inches ($69^{mm}$) to base of caudal. The greatest height of the body at the origin of the dorsal equals its greatest width over the base of the pectorals, and is contained nearly 4 times in its length without caudal. The least height of the tail is $\frac{1}{12}$ of the length without caudal. The length of the middle caudal rays is contained 4½ times in length of body.* Width of the mouth equals ½ the length of the head.

The maxillary extends a little behind the front margin of the eye. The snout is as long as the eye. The distance between the eyes is less than their diameter, and is contained 5 times in the length of the head; the diameter of the eye 4 times. The length of the lower jaw equals ½ the length of the head. Preoperculum armed with 4 spines; the largest is at the angle, and is about ½ as long as the eye; the 3 anterior ones are very small and hidden by the skin. The distance of the spinous dorsal from the snout is ⅓ of the length of the body; the length of the longest spine of the first dorsal is about ⅓ of that of the head and about ⅔ of the longest dorsal ray. The longest dorsal and anal rays are equal. The length of the anal base almost equals the length of the head. The length of the second dorsal base is a little greater than the length of the head.

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* Length of body here means length without caudal.

The pectorals reach to the origin of the anal; ventrals do not reach to the vent.

Vomerine and palatine teeth present. Skin smooth.

*Radial formula:* B. VI; D. VIII, 16; A. 12; V. I, 3; P. 15; C. 15.

*Color:* Uniform dark brown above, lighter on the throat and belly.

**Myctophum crenulare, J. & G.**

The museum has an additional specimen of this species, which was washed aboard a United States Coast Survey vessel commanded by Mr. William H. Dall, in N. lat. 49°, W. long. 151°. It was collected by Mr. W. G. Hall. The specimen is numbered 23945 in the National Museum Fish Catalogue.

DESCRIPTION.—D. I, 11; A. I, 16; P. 13; V. 7; scales 2½–45–6½.

The basis of comparison for the measurements of different parts of the body is the total length without caudal. The greatest height of the body is contained 4 times in this length, the length of the head 3⅔ times; the least depth of the tail equals ¼ of the height of the body at the ventrals, height of the head nearly equal to its length without snout. Eye large, its diameter being more than the interorbital distance, and contained 3 times in the length of the head. Posterior margin of the preoperculum oblique. Snout very short and obtuse, about ⅓ as long as the eye. The maxillary is ⅔ as long as the head, scarcely dilated posteriorly; it reaches almost to the posterior margin of the preoperculum. The origin of the dorsal fin is equally distant from the tip of the snout and the root of the caudal, and is about over the tips of the extended ventrals; it is about in the vertical through the sixteenth scale of the lateral line; its last ray is over the twenty-fifth scale of the lateral line and the eighth anal ray. The pectorals are imperfect, but they apparently do not extend much beyond the origin of the ventrals. Scales coarsely denticulated, some of them showing about 6 teeth on their free margin; those on the lateral line are conspicuously the largest. Lower parts with a double series of pearl-colored spots, besides a few isolated ones.

*Measurements.*

| | | |
|---|---|---|
| Current number of specimen | (716)<br>23945. | |
| Locality | Lat. 49° N.,<br>Long. 151 W.,<br>Sept. 15, 1871. | |
| | Millimeters. | 100ths of length. |
| Length to origin of middle caudal rays | 50 | 100 |
| Body: | | |
| Greatest height | | 25 |
| Greatest width | | 9 |
| Height at ventrals | | 24 |
| Least height of tail | | 6 |
| Length of caudal peduncle | | 20 |

*Measurements*—Continued.

| | | |
|---|---|---|
| Current number of specimen | (716)<br>23945. | |
| Locality | Lat. 49° N.,<br>Long. 151 W.,<br>Sept. 15, 1871. | |
| | Millimeters. | 100ths of length. |
| **Head:** | | |
| Greatest length | | 27½ |
| Greatest width | | 10 |
| Width of interorbital area | | 7 |
| Length of snout | | 3½ |
| Length of maxillary | | 18 |
| Length of mandible | | 18½ |
| Diameter of orbit | | 9 |
| **Dorsal (first):** | | |
| Distance from snout | | 52 |
| Length of base | | 17 |
| Length of longest ray | | 15 |
| **Dorsal (soft):** | | |
| Distance from snout | | 78 |
| Length of longest ray | | 7½ |
| **Anal:** | | |
| Distance from snout | | 56 |
| Length of base | | 23 |
| Length of longest ray | | 15 |
| **Pectoral:** | | |
| Distance from snout | | 26 |
| Length | | 14 |
| **Ventral:** | | |
| Distance from snout | | 37 |
| Length | | 12 |
| **Dorsal** | I, 11 | |
| **Anal** | I, 16 | |
| **Pectoral** | 13 | |
| **Ventral** | 7 | |
| **Number of scales in lateral line** | 45 | |
| **Number of transverse rows above lateral line** | 2½ | |
| **Number of transverse rows below lateral line** | 6½ | |

## NOTES ON THE FISHES OF THE PACIFIC COAST OF THE UNITED STATES.

### By DAVID S. JORDAN and CHARLES H. GILBERT.

It is the purpose of this paper to present a list of the species of fishes known to occur along our Pacific coast, between the Mexican boundary and the boundary of British Columbia, together with notes on the distribution, habits, size, value, etc., of each species, in advance of the publication of a general descriptive work. The paper is to be considered mainly in the light of a contribution to our knowledge of the geographical distribution of fishes. The "common names" here given are, in all cases, those heard by the writers among the fishermen on different parts of the coast.

### Family BRANCHIOSTOMATIDÆ.

1. **Branchiostoma lanceolatum** (Pallas) Gray.

Obtained by Dr. J. G. Cooper in San Diego Bay. Not seen by us.

### Family MYXINIDÆ.

2. **Polistotrema dombeyi** (Müller) Gill.—*Lamperina; Hag; Eel.*

Santa Barbara (*fide* J. Weinmiller) to Eel River (Lockington). Very abundant in the Bay of Monterey, but not taken elsewhere by us. It fastens itself usually on the gills or isthmus of large fishes, sometimes on the eyes, whence it works its way very rapidly into the inside of the body. It then devours all the flesh of the body without breaking the skin, so that the fish is left a mere hulk of head, skin, and bones. It is especially destructive to fishes taken in gill-nets. In every gill-net set at Monterey in summer, more or less of these empty shells are obtained. When these are taken from the water the hag-fish scrambles out with great alacrity. It is thought by the fishermen that the hags enter the fish after the latter are caught in the gill-net, and that they will devour a fish of 10 or 15 pounds weight in a single night. At any rate, large fishes of even 30 pounds are often brought up without flesh and without viscera, and we can hardly suppose that they swim about in the sea in this condition before coming into the gill-nets. The fish chiefly eaten are *Sebastichthys pinniger*, *miniatus*, *mystinus*, etc., *Ophiodon elongatus*, *Paralichthys maculosus*, and *Rhacochilus toxotes*.

The hag-fish reaches a length of 14 inches, and is not used as food.

The genus *Polistotrema* (Gill, MSS.) is distinguished from *Heptatrema* (*Bdellostoma*) by the presence of 11 or 12 gill-openings instead of 7.

### Family PETROMYZONTIDÆ.

3. **Ammocœtes plumbeus** (Ayres) J. & G.

San Francisco northward; seen by us at Seattle and San Francisco. Nothing especial known of its habits, but it doubtless ascends most of the coast streams in spring. It reaches a length of 8 inches, and is not brought into market except when accidentally mixed with other species.

4. **Entosphenus tridentatus** (Richardson) Gill.—*Lamprey; Lamperina.*

(*Petromyzon lividus*, *ciliatus*, *tridentatus*, and *astori* Girard.)

Monterey Bay to Puget Sound; seen by us at Santa Cruz and Astoria. It ascends the fresh waters in the spring to spawn, running in the Columbia in June. It reaches a length of more than 2 feet, and becomes very fat. It is never used as food so far as we know.

### Family NOTIDANIDÆ.

5. **Notorhynchus maculatus** Ayres.

From Monterey to Puget Sound. In Humboldt Bay it is extremely abundant, and it is much sought for the oil.

6. **Hexanchus corinus** Jordan & Gilbert.—*Shovel-nosed Shark.*

Monterey to Puget Sound; probably not uncommon. A fine example obtained at Neah Bay (Cape Flattery) by James G. Swan. Another taken by us at Soquel.

### Family HETERODONTIDÆ.

7. **Heterodontus francisci** (Girard) Duméril.—*Leopard Shark; Bull-head Shark.*

From Point Concepcion southward. Described by Girard from Monterey, but not seen by us there, and probably very rarely or never reaching San Francisco. Abundant at San Pedro and San Diego and not rare at Santa Barbara. It lays its eggs in January. They are enveloped in large cylindrical egg-cases, which are spirally twisted and without tentacles. This shark reaches a length of 2½ feet, and is used for no purpose.

### Family SCYLLIIDÆ.

8. **Catulus ventriosus** (Garman) J. & G.—*Ground Shark; Puffer Shark.*

From Monterey Bay southward. Abundant at Santa Barbara in winter, where it lives in the kelp, and is taken in large numbers in lobster-pots set for the "crawfish" (*Panulirus interruptus*), it being very fond of the salt fish used as bait. It is rarely taken in the summer, and it perhaps visits shallow water in the spawning season only, retiring to deeper water in summer. The egg-cases are extruded in February. They are flattish, oblong, quadrangular, with very long tentacles at the angles. This shark reaches a length of 2½ feet, and is valueless. It is remarkable for its habit of inflating its body by swallowing air, like a *Tetrodon.*

### Family GALEORHINIDÆ.

9. **Mustelus hinnulus** (Blainville) J. & G.—*Dog Shark.*
(*Mustelus californicus* Gill.)

From San Francisco southward. Very abundant at San Pedro and San Diego, living chiefly in bays and lagoons and feeding upon crustacea and small fish. It has very little oil in its liver, and is used only for crawfish bait and similar purposes. The young are sometimes salted and dried by the Chinese, tied in bundles, and shipped inland to the Chinese laborers on the railroads. They are not much valued even by them.

Most of the specimens seen were 2 to 2½ feet in length, but two adult females seen at San Pedro were 5 feet long and weighed about 40 pounds each.

10. **Rhinotriacis henlei** Gill.—*Dog Shark.*

Humboldt Bay to Monterey. Two adults 2½ feet long, with the young inside and nearly ready for delivery, were taken at Monterey in April. The embryo is connected to the uterus by a placenta, as in *Rhinotriacis* (*Pleuracromylon*) *lævis*, with which the present species is doubtless congeneric. Many young examples about a foot long were obtained of the Chinese fishermen at Potrero, near San Francisco, in August, and numerous others were seen in Humboldt Bay. This species is chiefly used for bait.

11. **Triacis semifasciatus** Girard.—*Leopard Shark; Catfish; Cat Shark.*

From Cape Mendocino southward; very abundant in all bays and along sandy shores. The adults enter the lagoons in summer to bring forth their young, and hundreds of them are sometimes taken at once with the seine. It reaches a length of about 3 feet and a weight of 25 pounds. It yields but very little oil, and is considered wholly worthless by all fishermen.

12. **Galeorhinus galeus** (Linnæus) Blainville.—*Oil Shark; White Shark.*

From Cape Mendocino southward; very abundant everywhere in bays and lagoons during the summer. It brings forth its young from May to August, entering shallow bays for this purpose. It is taken in large numbers for its fins and its oil at Soquel, Monterey, and especially at Westminster and Newport, in Los Angeles County. It is usually taken with hook and line, herring and other silvery fish being the best bait. It reaches a length of 5 or 6 feet and a weight of 50 pounds, although most of those taken range from 30 to 40. A single liver makes three-fourths to one gallon of oil. The pectoral, dorsal, and caudal fins are taken off and dried in the sun. The Chinese buy these at about 15 cents a pound when dried. They strip off the skin and remove the fleshy part, and the gelatinous rays of the fin are valued by them very highly for soup, selling when prepared at about $1.50 per pound. The fins of no other American shark are considered valuable by the Chinese.

13. **Galeocerdo tigrinus** Müller & Henle.—*Man-eater Shark.*

From San Diego southward. The jaws of a large example taken near San Diego were seen.

14. **Carcharhinus glaucus** (Linnæus) Jordan & Gilbert.—*Blue Shark.*

A young specimen taken near San Francisco is in the Museum of the California Academy of Sciences, and the jaws of an adult taken near Seattle are in the Museum of the University of Washington Territory.

15. **Eulamia lamia** (Risso) Gill.—*Bay Shark.*

A partially grown specimen and the jaws of an adult individual obtained at San Diego.

### Family SPHYRNIDÆ.

16. **Sphyrna zygæna** (Linnæus) Rafinesque.—*Hammer-head Shark.*

A specimen of this species was obtained by Dr. J. G. Cooper at San Pedro, and sent to the United States National Museum.

### Family ALOPIIDÆ.

17. **Alopias vulpes** (Gmelin) Bonaparte.—*Thresher.*

Occasionally taken at San Francisco and in Monterey Bay. Probably most abundant at Soquel, but seen by us only at Monterey.

### Family LAMNIDÆ.

18. **Lamna cornubica** (Linnæus) Müller & Henle.

A single specimen obtained at San Francisco. Another was taken last year at Santa Cruz, and a drawing of it made by Dr. C. L. Anderson.

**19. Isurus (? oxyrhynchus Rafinesque).**

Two jaws of a species of *Isurus*, supposed to be *I. oxyrhynchus*, were obtained at San Pedro.

**20. Carcharodon carcharias** (L.) J. & G.—*Man-eater Shark.*

Occasionally taken about Monterey Bay. One of 24 feet in length taken at Carmelo this year, and one of 20 feet at Soquel. One taken a few years ago at Soquel had a young sea-lion weighing 100 pounds in its stomach. It is valued only for the oil in its liver.

## Family CETORHINIDÆ.

**21. Cetorhinus maximus** (Linnæus) Blainville.—*Ground Shark.*

Occasionally taken about Monterey by the whalers, and sometimes entangled in gill-nets. About five taken during the present year at Soquel and Monterey, ranging from 26 to 31 feet in length. It is valued for the oil in its enormous liver.

## Family SCYMNIDÆ.

**22. Somniosus microcephalus** (Bloch) Gill.—*Ground Shark.*

From Puget Sound northward; not rare. Often taken on trawl-lines set for dog-fish. A specimen 8 feet in length seen by us at Victoria. The livers are used with those of the dog-fish for making "dog-fish oil". In habits this species is very sluggish, lying "on the water like a log".

## Family SPINACIDÆ.

**23. Squalus acanthias** Linnæus.—*Dog-fish; Spinarola.*

From Santa Barbara to Alaska; occasional southward; excessively abundant from Puget Sound northward. It lives especially in deep or quiet bays or channels, coming into shallower water in pursuit of herring or salmon. It feeds chiefly on herring, but will take any bait, even its own young. It is caught in great numbers with trawl-lines for its oil, both by white men and Indians. It reaches a length of about 3 feet. The young are brought forth in June in Puget Sound.

## Family SQUATINIDÆ.

**24. Squatina angelus** Duméril.—*Angel-fish; Angelo; Squat.*

From San Francisco southward; not uncommon. Seen by us at Soquel, Monterey, Santa Barbara, San Pedro, and San Diego. It reaches a length of nearly 5 feet and a weight of 60 pounds. It is not used for any purpose.

## Family TORPEDINIDÆ.

**25. Torpedo californica** Ayres.

Not common. Seen by us only at Soquel and San Francisco. It reaches a length of at least 2½ feet and a weight of nearly 50 pounds.

## Family RHINOBATIDÆ.

26. **Rhinobatus productus** Ayres.—*Guitar; Shovel-nosed Shark.*

From Cape Mendocino southward; exceedingly abundant from Santa Barbara to San Diego, inhabiting sandy shores. It brings forth its young in August. It reaches a length of 3 feet and a weight of 15 pounds. The tails of moderate-sized specimens are eaten by the Chinese and Mexicans, although little valued by either. The body is sometimes used for lobster bait.

27. **Platyrhinoidis triseriatus** (Jordan & Gilbert) Garman.

From San Francisco southward; generally abundant, with the preceding. It is viviparous, bringing forth its young in August, 4 to 6 in each ovarial sac. It reaches a length of 20 inches and a weight of 4 to 5 pounds. It is used for no purpose.

28. **Syrrhina exasperata** (Jordan & Gilbert) Garman.

Seen by us at San Diego only, where half-grown specimens are very abundant. No adults have been seen by us, but it will probably be found to be a viviparous (and therefore Rhinobatoid) species. It is not used as food.

## Family RAIIDÆ.

29. **Raia stellulata** Jordan & Gilbert.

Seen by us only in the Bay of Monterey, where it is very abundant in the winter and spring. Both adults and young are taken in great numbers in the gill-nets. It reaches a length of 30 inches. It is never sent to market, its dark color and very rough skin rendering it unsalable, the conventional ray being light brown and nearly smooth.

30. **Raia rhina** Jordan & Gilbert.

From Monterey to Vancouver's Island; less common than the others, but not rare. It reaches a length of 32 inches. In the neighborhood of San Francisco it is sent to the city markets with *R. binoculata* and *R. inornata;* elsewhere it is rarely eaten

31. **Raia inornata** J. & G.—*Ray; Skate; Raie.*

Very abundant about San Francisco and Monterey, where it is taken in gill-nets and seines. It reaches a length of 24 to 30 inches. It is brought into the San Francisco market in large numbers from the immediate vicinity, never being shipped from any considerable distance. The pectoral fins are alone eaten, and these chiefly by the French.

At Santa Barbara a variety or subspecies (var. *inermis*) of this form occurs in some abundance. It is similar in size and appearance, but has the spines and armature of the body and tail very little developed.

**32. Raia binoculata** Girard.—*Skate; Ray.*

(*Raia cooperi* Grd.)

From Monterey to Alaska; everywhere common; the largest and most abundant skate on the coast. It frequents bays and sandy shores, and is taken with nets or hooks. It feeds on crustaceans and fishes. Two specimens of *Cottus polyacanthocephalus*, each a foot long, were found in the stomach of one of these skates. The egg-cases are laid in July. They are quadrate, with very short tentacles, and are nearly a foot in length. *Raia binoculata* reaches a length of 5 to 6 feet and a weight of more than 60 pounds. It is generally the commonest species in the markets of San Francisco; elsewhere it is rarely used for food, and its liver yields but very little oil.

## Family TRYGONIDÆ.

**33. Urolophus halleri** Cooper.—*Round Sting Ray.*

From Point Concepcion southward; excessively abundant in the bays and lagoons. The bottom of portions of San Diego Bay is literally lined with these rays, who lie on the bottom nearly buried in loose sand or mud. This is the smallest, most abundant, and most dangerous of the sting-rays, striking quickly and accurately with its muscular tail. One taken in a net struck at another, the sting passing entirely through the body of the latter. This species reaches a length of 18 inches, and is never eaten.

**34. Pteroplatea marmorata** Cooper.—*Ray.*

From Santa Barbara southward; common in bays and along sandy shores. It reaches a length of 1½ feet, the breadth being about 2½. It is not usually recognized as a sting-ray, and is, therefore, frequently used as food, the larger ones taken at San Pedro being shipped to Los Angeles, where they are eaten by the French as *Raie.*

**35. Dasybatus dipterurus** Jordan & Gilbert.

Abundant in San Diego Bay; not seen elsewhere. It reaches a length of nearly 3 feet, exclusive of the tail. It is not used as food.

## Family MYLIOBATIDÆ.

**36. Myliobatis californicus** Gill.—*Stingaree; Sting Ray.*

(*Rhinoptera vespertilio* Grd.)

From Cape Mendocino southward; very abundant, especially about San Diego. Like the other species of sting-rays, it feeds on fishes and crustacea, and takes the hook readily. Its young are brought forth in July. It reaches a weight of 60 pounds or more, and is sometimes brought into the market of San Francisco.

**37. Aëtobatis laticeps** Gill.

California and southward; not obtained by us.

### Family CEPHALOPTERIDÆ.

38. **Manta birostris** (Walbaum) Jordan & Gilbert.
(*Ceratoptera vampyrus* Auct.)

We are informed on good authority that one or more individuals of this gigantic species have been taken by whalers near San Diego.

### Family CHIMÆRIDÆ.

39. **Chimæra colliæi** Bennett—*Rat-fish.*

From Monterey northward; extremely abundant everywhere along the coast in deep bays. It feeds on fish, etc., and takes the hook very readily. It lays its eggs in July, the egg-cases being long and slender, without tentacles. It reaches a length of nearly 2 feet and a weight of 6 to 8 pounds. It is not used for any purpose. The liver is extremely large and fat, and it is said that the oil it yields is superior to any sort of shark-oil, but the fish is too small for its pursuit to be profitable.

### Family ACIPENSERIDÆ.

40. **Acipenser transmontanus** Richardson.—*White Sturgeon; Common Sturgeon.*
(*Acipenser brachyrhynchus* and *acutirostris* Ayres.)

Common in the bays and large rivers from San Francisco northward, great numbers being taken in the Sacramento, Columbia, and Frazer's Rivers. It feeds on crustacea, etc., and in Frazer's River gorges itself on the eulachon. It runs up the rivers with the salmon in the spring, and probably spawns in the summer. It reaches a length of 8 to 15 feet and a weight probably of 300 to 400 pounds. It is largely used as food, although very cheap. In the restaurants it is usually called "sea-bass". Many sturgeons are smoked and caviar is made from the roe.

41. **Acipenser medirostris** Ayres.—*Green Sturgeon.*
(*Acipenser acutirostris* Gthr. non Ayres.)

This species is found in the same waters as the preceding, but is much less abundant. It reaches probably a similar size. It is not used as food, being reputed "poisonous" by the fishermen. Seen by us at San Francisco and Astoria.

### Family MURÆNIDÆ.

42. **Muræna mordax** Ayres.—*Conger Eel; Congaree.*

From Point Concepcion southward; abundant about all the Santa Barbara Islands. It lives among rocks near low-tide mark and takes the hook readily. It may sometimes be found on land at low tide. It is extremely pugnacious, "striking from the shoulder" like a snake. It reaches a length of about 5 feet and a weight of 15 to 20 pounds. It is used as food and the flesh is very fat, resembling that of *Anguilla.* Its skin is said to be poisonous ("very pizen") by the fisherman.

## Family ANGUILLIDÆ.

43. **Myrichthys tigrinus** Girard.

Recorded from Adair Bay, Oregon; unknown to us.

44. **Ophichthys triserialis** (Kaup) Gthr.

Dr. Cooper informs me that he has taken this species on the coast. A specimen from Lower California (the type of "*Ophisurus californiensis*" Garrett) is in the Museum of the California Academy of Sciences.

## Family NEMICHTHYIDÆ.

45. **Nemichthys avocetta** Jordan & Gilbert.

A single specimen, 22 inches in length, was taken at Port Gamble, in Puget Sound, and presented to the National Museum by President Anderson, of the University of Washington.

## Family ALBULIDÆ.

46. **Albula vulpes** (Linnæus) Goode.

Rather common in San Diego Bay, running in schools. It spawns late in summer. It reaches a length of about a foot. It is sold with the mullet when taken, and from its bright silvery coloration meets with a ready sale. It is, however, dry and bony, and but indifferent food.

## Family CLUPEIDÆ.

47. **Clupea mirabilis** Girard.—*Herring.*

Everywhere exceedingly abundant along the whole coast, especially northward; found south of Point Concepcion in winter only. At San Diego it spawns in January; further north much later. It is similar in size and value to the Atlantic herring, and, like it, is largely smoked or salted. The price in spring and summer is usually very low.

48. **Clupea sagax** Jenyns.—*Sardine; Sadına.*

Whole coast; very abundant southward, especially in winter. It is most common at San Diego, where it is taken with hook and line from the wharves. It reaches a length of about 9 inches, and is considered a rather better food-fish than the herring. No attempts have yet been made to put up this species in oil.

## Family ENGRAULIDÆ.

49. **Stolephorus compressus** (Girard) J. & G.—*Sprat.*

San Pedro and San Diego Bays; very abundant, but less so than the other species. Not seen northward. It reaches a length of about 6 inches. It is not worth much as food, the flesh being full of small, stiff bones.

50. **Stolephorus delicatissimus** (Girard) J. & G.

San Diego Bay; very abundant. Not seen elsewhere. A small species, reaching a length of less than 3 inches.

51. **Stolephorus ringens** (Jenyns) J. & G.—*Anchovy.*

Abundant in clear bays for the entire length of the coast. It reaches a length of about 6 inches, and it often comes into the markets. Its chief use is, however, as bait for flounders and rock-cod. The Chinese salt them in barrels for that purpose. It is sometimes pickled with spices by the Germans, and sold as "Norsk Anchovy".

## Family SALMONIDÆ.

52. **Salvelinus malma** (Walb.) J. & G.—*Dolly Varden Trout; Bull Trout; Salmon Trout.*

(*Salmo spectabilis* Grd.; *Salmo campbelli* Suckley; *Salmo lordi* Günther; *Salmo tudes* Cope; *Salmo callarias* Pallas; *Salmo bairdi* Suckley.)

Abundant in lakes and streams of the Cascade Range from Mount Shasta northward to Alaska. Large numbers are found in the salt waters of Puget Sound, where they are taken in seines and with hook and line.

In the mountains it is usually quite small; in the lakes larger. At Seattle and in Frazer's River it often reaches a weight of 12 pounds. It is an excellent food-fish. It feeds on sticklebacks (salmon-killers), herrings, and other small fish.

53. **Salmo irideus** Gibbons.—*California Brook Trout; Rainbow Trout.*

From Mount Shasta to San Luis Rey River, in streams of the Coast Range and west slope of the Sierra Nevada. Less common north of California, and seldom seen in salt water. It is not often sent to the market of San Francisco. It seems to be much smaller in size than the other species of the coast, rarely becoming more than 18 inches in length. The largest specimens seen are from McCloud River, and very deep bodied.

54. **Salmo gairdneri** Richardson.—*Steel-head; Hard-head; Black Salmon.*

(*Salmo truncatus* Suckley.)

Found in the mouths of the large rivers from the Columbia northward, and occasionally in the Sacramento. It appears with the salmon and is usually thought to be migratory, but is probably not so, or migratory to a small degree. It spawns later than the salmon, and most of the individuals taken during the time of the salmon run in the spring are spent, and their flesh is of no value. In other rivers than the Columbia, and at other seasons it is esteemed an excellent food-fish. Its length is about that of an ordinary Quinnat salmon; the body is less deep and the tail heavier. The usual weight is from 14 to 18 pounds. It is never canned, as the flesh is pale and grows paler when boiled, and the bones are firm and stiff.

55. **Salmo purpuratus** Pallas.—*Oregon Brook Trout; Salmon Trout; Lake Trout.* (*Salmo clarki* Rich.)

Very abundant in all waters north of Mount Shasta and through the Great Basin and Rocky Mountain region; occasional southward to Santa Cruz. Found in abundance in salt water in Puget Sound and about the mouth of the Columbia. It is usually seen of but 2 to 8 or 10 pounds in weight, but occasional specimens weighing as much as 25 pounds are taken in the Columbia in summer (*C. J. Smith*). These latter are known usually as steel-heads, although the common steel-head is *S. gairdneri;* the young as brook-trout, and the partly grown as salmon-trout. This is the most widely distributed of our trout, and it is subject to many variations.

56. **Oncorhynchus kisutch** (Walb.) J. & G.—*Coho Salmon of Frazer's River; Silver Salmon; Kisutch; Bielaya Ryba.* Skewitz.

Sacramento River to Puget Sound and northward; very abundant in summer and fall. It is rarely taken in the Columbia in the spring, but great numbers run up the river in the fall. It is one of the smallest of the salmon, reaching a length of about 30 inches and a weight of 4 to 8 pounds. As a food-fish it ranks with the young of *O. chouicha*, which it much resembles. It may be readily distinguished by the few (40–50) pyloric cœca. In *O. chouicha* there are about 180 pyloric cœca. In fall the males become greatly distorted and hook-jawed, and specimens in every stage can be found in late summer.

57. **Oncorhynchus chouicha** (Walb.) J. & G.—*Quinnat Salmon; King Salmon; Chouicha; Chinnook Salmon; Spring Salmon; Columbia River Salmon; Sacramento Salmon; Winter Salmon; White Salmon.* Sawkwey.

From Ventura River northward to Behring's Straits, ascending Sacramento, Rogue's, Klamath, Columbia, and Frazer's Rivers in spring, as well as the streams of Alaska, Kamtschatka, Japan, and Northern China; in fall ascending these and probably *all* other rivers in greater or less abundance; the young taken in Monterey Bay, Puget Sound, etc., in summer in considerable numbers. This salmon, by far the most important fish in our Pacific waters, reaches a weight of about 70 pounds. The average in the Columbia River is about 22 pounds; in the Sacramento River about 18; in other rivers usually still smaller.

58. **Oncorhynchus nerka** (Walbaum) Gill & Jordan.—*Blue-back; Sukkeye; Red-fish; Rascal; Frazer's River Salmon; Krasnaya Ryba.*

From Columbia River to the Aleutian Islands; the principal salmon of Frazer's River; unknown in Eel River, Rogue River, and in the Sacramento. In the Columbia River it is much less abundant than the Quinnat salmon, and its flesh is less firm and paler. It reaches a weight of 5 to 8 pounds, four "blue-backs" being counted at the canneries equal to one Chinnook salmon. It runs chiefly in the spring, few of them being seen on Frazer's River or the Columbia in the fall. Like the Quinnat it ascends streams to great distances. It is known in the fall as red-fish. In the upper courses of the Columbia and Frazer's River, this species and the preceding are the only salmon found. The blue-back, in all its protean forms, can readily be distinguished by the much longer and more numerous gill-rakers.

59. **Oncorhynchus keta** (Walb.) G. & J.—*Dog Salmon; Quarlsch; Kayko; Le Kai.*

San Francisco to Behring's Straits; very abundant in the fall, when it runs in all streams, but not to a great distance. Not seen by us anywhere in the spring. It reaches a weight of 12 to 20 pounds. As it is taken only in fall, after the development of the organs of generation has caused the deterioration of the flesh, it has little economic value. Considerable numbers are salted or dried by the Indians.

60. **Oncorhynchus gorbuscha** (Walbaum) Gill & Jordan.—*Humpback Salmon; Haddo; Hone; Holia.*

Sacramento River northward to the Arctic Sea; abundant in Puget Sound on alternate years, 1880 being a year of scarcity. Occasionally seen in the Columbia and Sacramento, but not sufficiently abundant to constitute a distinct run. It reaches a weight of 3 to 7 pounds, being the smallest of the salmon. The females are canned in summer and fall, the hook-jawed males being rejected.

The following table gives some of the specific characters of the species of *Oncorhynchus*. The figures given are the averages of variation, so far as known:

| Name. | Number of gill-rakers. | Number of anal rays (developed). | Number of pyloric cœca. | Number of scales in a longitudinal series. | Number of branchiostegals. | Average weight (pounds). | Markings. |
|---|---|---|---|---|---|---|---|
| Kisutch | $\frac{10}{13}$ | 13 | 70 | 128 | 13–14 | 6 | Back spotted; tail unspotted, except upper ray. |
| Chouicha | $\frac{10}{14}$ | 16 | 160 | 142 | 15–19 | 20 | Back and tail spotted. |
| Keta | $\frac{9}{14}$ | 15 | 160 | 145 | 13–14 | 12 | Dorsal region with fine spots, which are often obsolete. |
| Nerka | $\frac{16}{23}$ | 14 | 80 | 132 | 13–15 | 6 | No spots anywhere in spring; young with vague spots on back; tail speckled in fall. |
| Gorbuscha | $\frac{11}{17}$ | 14 | 225 | 180 | 12 | 4 | Back and tail spotted. |

61. **Hypomesus pretiosus** (Girard) Gill.—*Surf Smelt.*

From Monterey to Alaska; very abundant north of San Francisco, and often seen in the San Francisco markets. It deposits its spawn in the surf in the spring. It reaches a length of nearly a foot and becomes very fat. As a pan-fish it ranks very high, being scarcely inferior to the eulachon. The *Hypomesus olidus* of Kamtschatka has been shown by Dr. Bean to be a different species, spawning in fresh waters.

62. **Thaleichthys pacificus** (Richardson) Grd.—*Eulachon; Hoolakin; Candle-fish; Grease-fish; Smelt.*

From Oregon northward, ascending the rivers in spring in enormous numbers, but not for a great distance. It is especially numerous in Frazer's River and Nass River, and very many ascend the Columbia. The run in Frazer's River takes place in May. They are exceedingly fat, and when dry are said to burn like a candle. On Nass River is a factory for the manufacture of eulachon oil, intended as a substitute for cod-liver oil. The fact that eulachon oil is semi-solid or lard-like at ordinary temperature is a serious hindrance to its salability for this purpose. When fresh, the eulachon is one of the very finest of pan-fishes, and many of them are sent to the markets of Victoria. Pickled eulachons are sent to San Francisco. It reaches a length of a little less than a foot.

63. **Osmerus thaleichthys** Ayres.—*Smelt.*

From Monterey northward; rather common, but not in such great numbers as the surf-smelt and the eulachon. It is smaller and less valuable than these. Little distinctive is known of its habits. Those brought into market are usually soft, and are less salable than the spurious "smelt," *Atherinopsis*, with which they are often mixed. It is rarely more than 6 inches in length.

64. **Osmerus attenuatus** Lockington.—*Smelt.*

Everywhere found with the preceding and scarcely less common. Nothing distinctive is known of its habits, and it may possibly turn out to be the female of the same species.

## Family ALEPIDOSAURIDÆ.

65. **Alepidosaurus borealis** Gill.—*Hand-saw Fish.*

Puget Sound and northward, in deep water; cast on shore by storms. A head from Puget Sound in the Museum of the California Academy of Sciences, and another from the Aleutian Islands in the Museum of the Alaska Commercial Company.

## Family PARALEPIDÆ.

66. **Sudis ringens** Jordan & Gilbert.

Known only from one specimen, about 8 inches in length, from the stomach of a *Merlucius*, itself in the stomach of an *Orcynus alalonga*, in Santa Barbara Channel.

67. **Paralepis coruscans** J. & G.

One specimen obtained at Port Townsend, Wash. It is very close to *Paralepis borealis* Reinh. from Greenland, if not identical with it.

## Family SCOPELIDÆ.

68. **Synodus lucioceps** (Ayres) Gill.—*Dingaree Dock.*

From San Francisco southward; rather common in summer and sometimes brought into the markets. It reaches a length of about a foot, and is not much valued as a food-fish. This species differs from the Atlantic *Synodus fœtens* in the much greater number of scales in a vertical series, and in the longer pectorals, as well as in lesser details. The distinctive characters given by Ayres are mostly fallacious.

69. **Myctophum crenulare** Jordan & Gilbert.

One specimen, 2½ inches in length, taken from the stomach of *Orcynus alalonga*, in Santa Barbara Channel, in July. Another obtained off Vancouver's Island has been recorded by Dr. Bean.

## Family CYPRINODONTIDÆ.

70. **Cyprinodon californiensis** Girard.

Described from San Diego. Only the original types known.

71. **Fundulus parvipinnis** Girard.

From Point Concepcion southward; exceedingly abundant in muddy bays and lagoons, especially at the mouths of streams. The males in summer have the scales rough with small corneous appendages much as in some *Cyprinidæ*. This species reaches a length of 2½ inches, and is used for no purpose.

## Family SCOMBERESOCIDÆ.

72. **Exocœtus californicus** Cooper.—*Flying-fish; Volador.*

In great schools in summer, ranging north to Point Concepcion, and very abundant about all the Santa Barbara Islands. It flies for a distance sometimes of nearly a quarter of a mile, usually not rising more than 3 or 4 feet. Its motion in the water is extremely rapid, and its motive power is certainly chiefly due to the movement of its powerful tail in the water. On rising from the water the movements of the tail are continued for some seconds until the whole body is out of the water. While the tail is in motion the pectorals are in a state of very rapid vibration and the ventrals are folded. When the action of the tail ceases, the pectorals and ventrals are spread, and, so far as we can see, held at rest. When the fish begins to fall, the tail touches the water and the motion of the pectorals recommences. When on the wing it resembles a huge dragon-fly. Its motion is very swift. At first it is in a straight line, but this becomes deflected to a curve, the pectoral on the inner side of the arc being bent downward. It is able to some extent to turn its course to shy off from a vessel. The motion seems to have no reference to the direction of the wind, and we observed it best from the bow of a steamer off Santa Catalina Island in early morning, when both air and water were free from motion.

The flying-fish reaches a length of 15 inches and a weight of about 1½ pounds. It is considered an excellent food-fish, and is taken in large numbers off Santa Catalina for the market of Los Angeles. It appears only about the middle of summer, which is its season of spawning. Nine-tenths of those seen by us in July were males.

73. **Hemirhamphus rosæ** Jordan & Gilbert.

Rather abundant in San Pedro and San Diego Bays, swimming slowly about near the surface. It reaches a length of probably not over a foot, and is used for no purpose.

74. **Scomberesox brevirostris** Peters.

One specimen taken in Monterey Bay. Recorded by Dr. Ayres from Tomales Bay.

75. **Tylosurus exilis** (Grd.) J. & G.—*Needle-fish; Gar-fish.*

From Santa Barbara southward; rather common in summer, especially in San Diego Bay. It lives in sheltered bays, swimming near the surface. It spawns in August. It reaches a length of about 2½ feet, and is esteemed a good food-fish.

## Family MUGILIDÆ.

76. **Mugil albula** L. (*Mugil mexicanus* Steindachner).—*Mullet; Chub.*

From Monterey southward; very abundant in San Diego Bay. It ascends all creeks and lagoons in winter, and many of them become landlocked and are destroyed by the pelicans. It is said to be spreading northward along the coast, and to have first appeared at San Pedro about three years ago. It reaches a length of about 15 inches, and when taken in clear water is much esteemed. Many of those brought into the market are seined in muddy lagoons, and the flavor of the water is imparted to the flesh of the mullet. Like other mullets, this species feeds on mud. It is not obviously different from the common mullet of the Atlantic coast.

## Family ATHERINIDÆ.

77. **Leuresthes tenuis** (Ayres) Jordan & Gilbert.

Seen at San Diego only; in some parts of the bay occurring in immense schools, but not generally common. This is one of the smaller species of the family, reaching a length of rarely more than 4 inches.

78. **Atherinops affinis** (Ayres) Steindachner.—*Little Smelt; Petite Smelt.*

Cape Mendocino southward; abundant, especially in bays and lagoons, generally preferring more sheltered places than the next species. It reaches a length of about a foot, and is a pan-fish of good quality, having firm, white flesh, which is rather dry. Many of them are dried by the Chinese.

79. **Atherinopsis californiensis** Girard.—*Common Smelt.*

From Cape Mendocino southward; very abundant, being taken with the seine in great numbers in all open bays. It is also often taken by trolling with a small hook. It reaches a length of about 18 inches, and is one of the most important food-fishes on the coast. Its flesh is firm, white, and delicate, but rather dry. The genus *Atherinopsis* is distinguished by its non-protractile premaxillaries.

## Family SPHYRÆNIDÆ.

80. **Sphyræna argentea** Girard.—*Barracuda; Barracuta.*

Abundant in summer from San Francisco southward, especially about Monterey (Soquel) and the Santa Barbara Islands. The chief run is in July. It spawns in August, and then disappears, probably retiring into deeper water, or perhaps moving southward. It is taken chiefly by trolling at a distance of 3 or more miles from the mainland. About the islands it may be sometimes taken by still-fishing. The young are often taken in seines in winter. It reaches a length of about 3 feet and a weight of about 12 pounds. It is considered one of the best food-fish, and when salted and dried sells at a higher price than any other, even than the Alaska cod-fish.

## Family AMMODYTIDÆ.

81. **Ammodytes personatus** Girard.—*Sand Lant; Sand Lance.*

Abundant along sandy shores from Monterey to Alaska. Found in immense schools in Puget Sound. It burrows in the sand between tide-marks. It reaches a length of 5 or 6 inches, and is sometimes taken for bait.

## Family ECHENEIDÆ.

82. **Remora jacobœa** (Lowe) Gill.

A single specimen seen in the market at San Francisco. It is probably not uncommon.

83. **Echeneis naucrates** L.

Occasionally taken about San Francisco.

## Family XIPHIIDÆ.

84. **Xiphias gladius** Linné.—*Sword-fish; Espada.*

Occasionally seen about Santa Catalina and the Coronados, but never taken, the fishermen having no suitable tackle. One seen by us off Santa Monica about 8 feet in length.

## Family SCOMBRIDÆ.

85. **Scomber scombrus** Linné.—*Eastern Mackerel.*

Not seen by us. Capt. Charles Willughby, Indian agent at Neah Bay, formerly a mackerel-fisher in Massachusetts, informs us that he once netted a school of true eastern mackerel off Santa Catalina Island. J. Weinmiller, of Santa Barbara, has also taken them occasionally off Anacapa Island. There is little doubt of the casual occurrence of this species on our Pacific coast.

87. **Scomber pneumatophorus** Delaroche.—*Easter Mackerel; Tinker Mackerel; Little Mackerel.*

(*Scomber diego* Ayres; *Scomber dekayi* Storer.)

From Monterey southward; coming in irregular and often large schools in summer and fall. It reaches a length of a little more than a foot.

88. **Orcynus alalonga** (Gmelin) Risso.—*Albicore.*

(*Orcynus pacificus* Cooper; *Thynnus pacificus* C. & V.)

From San Francisco southward; abundant in summer south of Point Concepcion and taken by trolling. It is found in deeper water than the bonito, being rarely taken within 6 miles of the shore. It feeds on anchovy and squid, and occasionally rare deep-water fishes are found in its stomach. It is shorter and deeper than the bonito, weighing 12 to 15 pounds. It is little valued as a food-fish, selling at about 25 cents. It is caught chiefly for sport, as it is a very gamy fish.

Another *Orcynus*, known as the "tuna", exists about Santa Cruz Island, but we failed to obtain it.

89. **Sarda chilensis** (Cuvier & Valenciennes) J. & G.—*Bonito; Spanish Mackerel; Skipjack; Tuna.*

From Monterey southward; very abundant everywhere in summer, when it is taken in great numbers, by trolling, at a distance of 2 or 3 miles from shore. It is extensively salted and dried, but the flesh is rather coarse, and it brings a lower price than the yellow-tail and barracuda. It reaches a weight of about 12 pounds and sells at about 25 cents. After the spawning season the young are very abundant in the kelp.

90. **Scomberomorus concolor** (Lockington) Jordan & Gilbert.

Monterey Bay. It comes to the market at San Francisco from Soquel every year, but in small numbers. Rarely more than 18 or 20 come in in a single season. This year (1880) upwards of 40 were taken, nearly half of which were secured by us. Its usual price in the market of San Francisco is about $2.50. The female is marked by two rows of alternating, round, bronze spots about the size of the pupil.

## Family CORYPHÆNIDÆ.

91. **Coryphæna** (species).

A dolphin came ashore in a storm at Cayucos a few years since. Its captor and eater informs us that he is well acquainted with the dolphin in Mexican waters, and that this was the same fish.

## Family STROMATEIDÆ.

92. **Stromateus simillimus** Ayres.—*Pompano.*

Entire coast; common, but most abundant from Santa Barbara to San Francisco. Its movements on the coast are very irregular. It is usually scarce in winter everywhere, and it is said that it was formerly much less abundant than now. It is taken in seines, and also by hook and line or grab-hook from the wharves. It is usually esteemed as the best pan-fish on the coast, and always brings a high price—25 to 50 cents per pound. It reaches a length of 8 inches and a weight of little more than half a pound.

## Family CARANGIDÆ.

93. **Seriola lalandi** Cuvier & Valenciennes.—*Yellow Tail; White Salmon; Cavasina.*
(*Seriola mazatlana* Steindachner.)

Only about the Santa Barbara and Coronados Islands, where it is abundant in summer, spawning in July and August; not seen in winter. It is taken by trolling only. As a fresh fish it ranks high. When salted it is graded as best, with *Dekaya* and *Sphyræna.* It feeds on squid and various small fishes, and reaches a weight of 40 to 50 pounds and a length of 4 to 5 feet. The "horse-mackerel, *Halatractus dorsalis*", referred to by Dr. Cooper in Cronise's Natural Wealth of California, is undoubtedly the present species.

94. **Caranx caballus** Günther.
(*Trachurus boops* Grd.)

Only the original type of Girard's description has been taken on our coast.

95. **Trachurus plumierianus** (Lacépède) J. & G.—*Horse Mackerel.*
(*Trachurus trachurus* Günther; *Trachurus symmetricus* Ayres.)

Very abundant in summer as far north as Monterey. It is taken in seines in large numbers and used chiefly for bait. Many of them are salted for this purpose. It reaches a length of about a foot and a weight of less than a pound.

Specimens of this species from Monterey and from Venice are not obviously different. The individual variations in the curvature of the lateral line are considerable.

## Family SERRANIDÆ.

96. **Serranus maculofasciatus** Steindachner.—*Cabrilla; Rock Cod; Rock Bass.*

San Pedro to San Diego and southward; abundant in the bays, especially at San Diego, where many are taken in seines, and with hook and line from the wharves. Not seen northward and not found in deep water or about the islands. It feeds chiefly on crustaceans and squid. It reaches a length of about 15 inches and a weight of 2 or 3 pounds, and is considered an excellent food-fish.

97. **Serranus nebulifer** (Grd.) Steind.—*Johnny Verde; Cabrilla; Rock Bass.*

From Monterey Bay southward; common about San Pedro and in San Diego Bay with the preceding. It reaches a length of 18 inches and a weight of 3 to 4 pounds, and is considered a good food-fish.

98. **Serranus clathratus** (Grd.) Steind.—*Cabrilla; Rock Bass; Kelp Salmon.*

From San Francisco southward; very abundant south of Point Concepcion. One of the most common food-fishes about the islands. It feeds on crustacea and squid, and is found in not very deep water, chiefly about rocks. It reaches a length of 18 inches and a weight of about 5 pounds. It is considered one of the better class of food-fishes. It is not often split and salted.

99. **Stereolepis gigas** Ayres.—*Jew-fish; Black Sea Bass.*

From the Farallones southward, chiefly about the islands; not rare, but from its great size not very often taken. Taken by still-fishing, not by trolling. It attains a weight of 400 to 500 pounds. Often taken by swallowing white fish, etc., when the latter are on the hook.

## Family PRISTIPOMATIDÆ.

100. **Xenichthys californiensis** Steind.

Described from San Diego. No specimens obtained by us.

101. **Pristipoma davidsoni** Steindachner.—*Sargo.*

San Pedro to San Diego; not common. Four seen by us at San Pedro. Probably only taken in summer, and then in small numbers. Feeds on crustacea. Reaches a length of somewhat more than a foot.

## Family SPARIDÆ.

102. **Scorpis californiensis** Steindachner.—*Media-luna; Half-moon.*

Santa Barbara Islands and southward. Especially abundant about Catalina, where it is one of the principal food fishes, being taken in great numbers in gill-nets. Rare at Santa Cruz Island, and probably not found northward. One in the Museum of the California Academy said to come from Tomales Bay. Feeds chiefly on crustacea. It reaches a length of about a foot and a weight of 3 pounds. It is not often dried, but ranks high as a pan-fish.

103. **Girella nigricans** (Ayres) Gill.—*Blue-fish.*

From Monterey southward; abundant about the Santa Barbara Islands, where it is an important food-fish. Taken chiefly in gill-nets. It is entirely herbivorous. It is very tenacious of life, but begins to soften soon after death. It reaches a length of about a foot and a weight of 4 pounds. It is considered a fair pan-fish.

## Family EPHIPPIDÆ.

104. **Chætodipterus faber** (Bloch) Bleeker.

Described from San Diego as *Ephippus zonatus* Grd. Not obtained by us.

## Family SCIÆNIDÆ.

105. **Seriphus politus** Ayres.—*Queen-fish; King-fish.*

From San Francisco southward; abundant in summer. Found along sandy shores and taken with seines, sometimes in great numbers, notably at Santa Barbara and Soquel. It is considered the best of the small Sciænoids, but is too small to be of very great importance. It reaches a length of 8 inches, but is usually still smaller.

106. **Cynoscion parvipinne** Ayres.—*Blue-fish; Corvina; Cararina; Sea Bass.*
(*Otolithus magdalenæ* Steind.)

From San Pedro southward; very abundant at San Diego. It frequents the bays, and is taken in seines and gill-nets. It feeds chiefly on crustacea. Its flesh is extremely good when fresh, but it soon softens, being similar to that of the weak-fish (*C. regale*) in that respect. It reaches a length of about 2 feet and a weight of 8 pounds.

107. **Atractoscion nobile** (Ayres) Gill.—*White Sea Bass; Sea Bass; Sea Trout* (*yg.*); *Corvina.*
(*Otolithus californiensis* Steind.)

From San Francisco southward; very abundant in spring and summer; not often seen in winter; only adults usually taken in spring. Caught by trolling and in gill-nets, the young in summer by seines. It reaches a length of 4 feet and a weight of 50 pounds or more. Its flesh is highly esteemed, and is much firmer than that of the eastern weak-fish. The food consists of crustacea, anchovies, etc.

The young ("sea trout") is often considered by fishermen as a distinct species.

108. **Menticirrus undulatus** (Grd.) Gill.—*Bagre; Sucker; Sucker Bass.*

From Santa Barbara southward; abundant; taken in seines and gill-nets along sandy shores. It reaches a length of 18 inches and a weight of 2½ pounds. It is held in moderate esteem as a food-fish. It feeds largely on crustacea. Girard's type of *Umbrina undulata* is a very young specimen of this species.

109. **Umbrina xanti** Gill.—*Yellow-finned Roncador; Yellow-tail Roncador.*

From Santa Barbara southward; generally abundant. Found along sandy shores, and taken in seines and gill-nets. It feeds on crustacea, squids, etc., and spawns in July. It reaches a length of about a foot and a weight of nearly 2 pounds. It is considered a food-fish of good quality, and many are split and salted at San Pedro.

110. **Roncador stearnsi** (Steind.) J. & G.—*Roncador; Croaker.*

From Santa Barbara southward; generally abundant on sandy shores, in rather deeper water than the *Umbrina*. Taken chiefly in the gill-nets. It feeds mostly on crustacea, and spawns in July. It reaches a length of about 2 feet and a weight of 5 or 6 pounds. It is considered a good food-fish.

111. **Corvina saturna** (Grd.) Gthr.—*Red Roncador; Black Roncador.*

From Santa Barbara southward; in similar situations with the preceding, but less abundant. It reaches a length of 16 to 18 inches and a weight of 3 pounds. Like the *Menticirrus* it is less attractive in color than *Umbrina* and *Roncador*, but is probably similar in flesh.

112. **Genyonemus lineatus** (Ayres) Gill.—*Little Bass; Little Roncador.*

From San Francisco southward; not common in winter, but excessively abundant in summer, especially from Santa Barbara northward. It lives between the shore and the kelp, and is taken with hook and line at the border of the kelp, and also in great numbers in seines. Its food is chiefly crustacea. It reaches a length of less than a foot and a weight of nearly a pound. It is rather soft, and not much valued as food, although excellent when fresh. Many are dried by the Chinese.

## Family EMBIOTOCIDÆ.

(*Perch; Surf-fish.*)

The fishes of this family are exceedingly abundant along our entire Pacific coast, the centre of distribution being from Santa Barbara to San Francisco. They all go by the general name of perch, and the fishermen rarely make any distinction of the species. All are ovoviviparous, bringing forth their young, 15 to 20 at a time, in spring or early summer. The young are then 1½ to 2½ inches in length, and perfectly able to take care of themselves. At birth they closely resemble the adult fish, but are redder, more compressed, and with higher fins. The flesh of the Embiotocoids is very similar in all the species, being flavorless and poor.

113. **Rhacochilus toxotes** Agassiz.—*Alfione; Sprat; Perch.*

San Pedro to San Francisco; rather common, especially about Soquel. Like the other species of the family, it feeds on crustacea and small fish. This species is the largest of the family, reaching a weight of 4 pounds, and is considered the best of this very inferior group.

114. **Damalichthys argyrosomus** (Girard) J. & G.—*White Perch.*

From San Pedro to Puget Sound; generally common and exceedingly abundant in Puget Sound; next to *Ditrema laterale* and *Micrometrus aggregatus*, the species most numerous in individuals on the coast. It is considered as, next to the preceding, the best of the *Embiotocidæ*, and reaches a weight of 2 pounds.

**April 30, 1881.**

The genus *Damalichthys* is distinguished from *Ditrema* by the extraordinary development of the pharyngeal bones.

**115. Ditrema furcatum** (Grd.) Gthr.

San Diego to San Francisco; exceedingly abundant everywhere. Not noticed northward. It lives in sheltered bays and is taken with seines. It rarely reaches a pound weight, and is little esteemed.

**116. Ditrema atripes** J & G.

Monterey Bay; abundant at Monterey, where large numbers are taken in seines. It reaches the weight of 1¼ pounds.

**117. Ditrema laterale** (Agassiz) Gthr.—*Perch; Surf-fish; Blue Perch*

Santa Barbara to Puget Sound; very abundant. Northward the most common of the larger species. It reaches a weight of 2 pounds, and is an important market fish, although poor and watery.

**118. Ditrema jacksoni** (Agassiz) Gthr.—*Perch; Croaker; Surf-fish.*

San Diego to Puget Sound; scarce north of San Francisco, but extremely abundant south of Point Concepcion, and brought in large numbers to the markets. It reaches a weight of 1½ pounds, and is about as poor as the rest of the tribe.

**119. Hypsurus caryi** (L. Agassiz) A. Agassiz.—*Bugara.*

Tomales to Santa Barbara; generally very abundant in the edge of the kelp, especially at Monterey. It is often taken with hook and line or baited dip-nets, and sometimes in great numbers in seines. It is used chiefly for bait for rock cod, the larger ones being sent to the markets. It rarely weighs more than half a pound. In color it is one of the most brilliant and attractive.

**120. Amphistichus argenteus** Agassiz.—*Surf-fish; White Perch.*

Tomales to San Diego; locally very common on sandy shores, especially in the surf; more abundant at Soquel and Santa Barbara than elsewhere. It reaches a weight of 1½ pounds.

**121. Holconotus rhodoterus** Ag.

Tomales to Santa Barbara; not so common as most of the other species, but often locally abundant; most numerous at Soquel. It reaches a weight of nearly 1½ pounds.

**122. Holconotus agassizi** (Gill) J. & G.

Tomales to Santa Barbara; in abundance and distribution similar to the preceding species. It rarely weighs over ½ pound.

**123. Holconotus argenteus** (Gibbons) J. & G.—*Wall-eye; White Perch.*

San Diego to Tomales; everywhere abundant. Taken with seines in great numbers in sandy shores, and often with hook and line from the wharves. It weighs about ½ pound, and is little esteemed.

124. **Holconotus analis** (A. Agassiz) J. & G.

San Francisco to San Luis Obispo; only locally abundant. Common only at Soquel and Santa Cruz, where it is largely taken, with *Micrometrus*, as bait for rock-fish, etc. It weighs less than ¼ pound, and seldom comes into the markets.

125. **Brachyistius rosaceus** J. & G.

About San Francisco; occasionally brought in with sweep-nets; not seen elsewhere. Its weight is usually less than ½ pound. It is the most brightly colored of the *Embiotocidæ*.

126. **Brachyistius frenatus** Gill.

From Catalina Island to Puget Sound; widely distributed and often locally very abundant, as at Monterey, Point Reyes, etc. It is used chiefly for bait, never coming into the markets except by accident when mixed with other fish. Weight ¼ pound.

127. **Micrometrus aggregatus** Gibbons.—*Shiner; Sparada; Minnie; Little Perch.*

Entire coast from San Diego to Puget Sound; everywhere the most abundant species of the group. Found especially in sheltered bays. It weighs less than ¼ pound, and is used only for bait.

128. **Abeona aurora** J. & G.

Known only from Monterey Bay, where it is very abundant about rocks. Many of them inhabit the larger rock-pools at Point Pinos. It reaches a weight of about ⅓ pound, and is occasionally sent to the San Francisco market.

129. **Abeona minima** (Gibbons) Gill.—*Shiner.*

Tomales to San Diego; rather common, but less abundant than most of the other species. It is the smallest of the tribe, rarely weighing ¼ pound. The genus *Abeona* is distinguished from *Cymatogaster* by its trilobate incisor-like teeth.

130. **Hysterocarpus traski** Gibbons.—*Fresh-water Perch.*

Sacramento and San Joaquin Rivers, and streams southward as far as San Luis Obispo; probably abundant. Many are brought into the market of San Francisco, where they are eaten chiefly by the Chinese. It reaches a weight of less than ½ pound.

## Family LABRIDÆ.

131. **Pimelometopon pulcher** (Ayres) Gill.—*Red-fish; Fat head.*

Point Concepcion southward; very abundant in the kelp, and taken in immense numbers by the Chinamen, who salt and dry them. It feeds on crustacea and shells. The flesh is rather coarse, but the fat forehead is esteemed for chowder. It reaches a weight of 12 to 15 pounds. Rare instances of its occurrence at Monterey are on record.

132. **Platyglossus semicinctus** (Ayres) Günther.—*Kelp-fish.*

Santa Catalina and southward; not rare in the kelp; occasionally taken in the gill-nets at San Pedro, and sometimes with a hook. It reaches a weight of about a pound.

133. **Oxyjulis modestus** (Grd.) Gill.—*Señorita; Pesca Rey.*

From Monterey southward; common in the kelp, and often taken with hook or line or baited dip-net. It reaches a weight of little more than ¼ pound, and is used chiefly for bait, although said to have flesh of fine quality.

## Family POMACENTRIDÆ.

134. **Chromis punctipinnis** Cooper.—*Blacksmith.*

Santa Barbara Islands and southward; abundant; taken with gill-nets or hook and line. It feeds, like the other species, on shells and crabs. It is not much valued as food, and reaches a weight of about 2 pounds.

The record by Yarrow and Henshaw of *Chromis atrilobata* Gill from Santa Barbara refers to this fish. (Wheeler's Surv., Appendix NN, Ann. Rept. Chief Engin., 1878, 203.)

135. **Hypsypops rubicundus** (Grd.) Gill.—*Garibaldi; Red Perch; Gold-fish.*

Abundant about the Santa Barbara Islands and southward; taken chiefly with gill-nets. It reaches a weight of 3 to 4 pounds, and is not held in very high esteem as a food-fish, although gorgeously colored.

## Family TRACHYPTERIDÆ.

136. **Trachypterus ? altivelis** Kner.—*King of the Salmon.*

Comes ashore occasionally when pursued by other fishes or after storms. The Makah Indians consider them the kings of the salmon, and will not let any one eat them.

Three specimens are certainly known—one from Santa Cruz (Dr. C. L. Anderson), and two from Neah Bay (Judge J. G. Swan). The specimen from Santa Cruz, about a foot long, examined by us, is evidently close to *T. altivelis*, the differences noticed being perhaps due to age.

## Family ICOSTEIDÆ.

137. **Icosteus ænigmaticus** Lockington.

San Francisco and northward, in deep water; two found in San Francisco market; one in University of California from the coast of Northern California. It reaches a length of about 10 inches.

138. **Icichthys lockingtoni** J. & G.

San Francisco and northward, in deep water. The only specimen known, found in the market at San Francisco, is about 8 inches long.

139. **Bathymaster signatus** Cope.—*Ronchil.*

Puget Sound and northward, in deep water; taken with hook and line about Seattle, in some abundance on a reef of ballast rocks, in deep water, tolerably abundant. It reaches a length of 6 to 8 inches, and is used chiefly for bait.

## Family LATILIDÆ.

140. **Dekaya*** **princeps** (Jenyns) J. & G.—*White-fish; Yellow-tail.*

From Monterey southward; abundant about all the islands, but only occasional at Monterey. It feeds largely on crustacea. It is taken chiefly with hook and line from reefs. Many of them are salted and dried both by Americans and Chinese. As a salted fish it ranks high; as a fresh fish of fair grade. It reaches a length of over 2 feet and a weight of 10 to 14 pounds.

## Family TRACHINIDÆ.

141. **Trichodon stelleri** C. & V.

Alaska; occasionally southward to San Francisco; not seen by us from this coast. A specimen in Alaska Commercial Company's collection from Aleutian Islands.

## Family GOBIIDÆ.

142. **Gillichthys mirabilis** Cooper.—*Mud-fish.*

From San Francisco southward, abounding in the muddy bottom of creeks and slimy lagoons into which the tide flows; very abundant about Oakland and at San Pedro and San Diego. It burrows into the mud, the bottoms being honeycombed with its holes. Two small specimens of a species of this genus were taken in the stomach of a *Hexagrammus stelleri*, in Saanich Arm, Vancouver's Island. It reaches a length of 5 or 6 inches. It may readily be taken with a small hook. Mr. Charles R. Orcutt obtained them for us in a creek near San Diego at the rate of 50 per hour.

143. **Eucyclogobius newberryi** (Grd.) Gill.

Not obtained by us. Described from Tomales Bay.

144. **Lepidogobius gracilis** (Grd.) Gill.

From San Francisco northward; occasionally taken in the sweep-nets with the tom-cod, and thus brought into the markets; seen by us at San Francisco and Victoria. It reaches a length of 4 inches. Nothing special is known of its habits.

145. **Gobius glaucofrenum** (Gill) J. & G.

Not seen by us. Described from Puget Sound.

146. **Othonops eos** Rosa Smith.

The specimens known found burrowing in sand among rocks about Point Loma, near San Diego. Locally very abundant.

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* *Caulolatilus* Gill: *nomen nudum.*

## Family CHIRIDÆ.

147. **Anoplopoma fimbria** (Pallas) Gill.—*Horse Mackerel; Candle-fish; Beshowe.*

From Monterey northward; generally common, especially in Puget Sound, where many are taken from the wharves, especially at Seattle. Taken by the Chinese at Monterey with set-lines, in rather deep water, and about San Francisco in winter with sweep-nets. It feeds on crustacea, worms, and small fish, and reaches a length of 40 inches and a weight of 15 pounds; those usually seen rarely exceed 2 or 3 pounds. As a food-fish it is generally held in low esteem, although sometimes fraudulently sold as "Spanish mackerel". The large specimens taken in deep water about Vancouver's Island, known to the Makah Indians as Beshowe, are highly valued as food-fish, according to Mr. Swan.

148. **Myriolepis zonifer** Lockington.

The only specimen known came from Monterey Bay. It is about 10 inches in length.

149. **Oxylebius pictus** Gill.

From Monterey northward, living among rocks near shore, in clear waters; not very rare, but from its small mouth and peculiar habits very rarely taken except for bait in dip-nets baited with crushed crabs. Seen by us at San Francisco, Monterey, and Saanich. It reaches a length of 6 to 8 inches, and is used only for bait.

150. **Zaniolepis latipinnis** Grd.

From San Francisco northward, in rather deep water. It is taken in large numbers in the sweep-nets of the paranzelle, and is occasionally brought into the markets of San Francisco. It feeds on crustacea, reaches a length of about a foot, and is not often eaten.

151. **Ophiodon elongatus** Grd.—*Cultus Cod; California Cod; Blue Cod; Buffalo Cod; Ling.*

From Santa Cruz Island northward; excessively abundant from Monterey to Victoria and beyond. It lives about rocky places, and is taken with hook and line or gill-net. Many are dried by the Chinese and Indians. It feeds on crustacea, squid, and various fishes. It reaches a larger size northward than about San Francisco, the greatest length being nearly 5 feet and the weight 50 or 60 pounds; most seen in market are considerably smaller. It is one of the better food-fishes, and in amount is one of the most important on the coast. Its flesh is usually of a pale livid blue.

152. **Hexagrammus decagrammus** (Pallas) J. & G.—*Boregat; Sea Trout; Bodieron; Rock Trout.*

From San Luis Obispo northward; everywhere moderately common, most so in the Bay of Monterey and off San Francisco. A common fish of the San Francisco markets. It feeds chiefly on crustacea and worms. It dies soon after being taken from the water, and does not keep very long before softening. The fish spawns in July. The males (*Chiropsis constellatus* Grd.) and the females (*C. guttatus* Grd.) differ so much in color that they have been usually taken for distinct species. The form lately described by Mr. Lockington as *Chirus maculoseriatus* is, so far as we have noticed, always female, and it seems to vary by insensible degrees into the ordinary *guttatus*. It reaches a length of 15 inches and a weight of 2–3 pounds. It is a food-fish of fair quality, but inferior to the *Ophidon* and *Sebastichthys*.

153. **Hexagrammus superciliosus** (Pallas) J. & G.—*Sea Trout.*

From Monterey northward; not very common south of Puget Sound, and not very abundant there. In food, size, and qualities identical with the preceding. The color is quite variable and the flesh is often blue.

154. **Hexagrammus asper** Steller.—*Starling.*

(*Chirus hexagrammus* Gthr.; *Chirus trigrammus* Cope.)

From Puget Sound northward; abundant everywhere in Puget Sound. Taken in rocky places with seines and gill-nets. Intestines usually with long tænioid worms. Size and value same as that of other species. The type of *Chirus nebulosus* Girard belongs to this species. The tips of the first three soft rays have been broken off, and they were taken by Girard for spines.

## Family SCORPÆNIDÆ.

155. **Sebastodes paucispinis** (Ayres) Gill.—*Boccaccio; Merou; Jack; Tom Cod.*

Coast from San Francisco to the Santa Barbara Islands, inhabiting chiefly reefs in deep water, the young coming near shore. Taken mostly with hook and line. It feeds on various small fish. It reaches a weight of 12 to 14 pounds, and is one of the best food-fishes. Many are taken in the winter at Monterey, and in the summer the young from the wharves.

### Genus SEBASTICHTHYS Gill.

The members of this extensive genus are extremely abundant on our Pacific coast, and form one of the most striking features of its fauna. All are food-fish of good quality, and are sold in the markets under the general name of rock-fish or rock-cod. All the species are ovoviviparous. The young are produced in enormous numbers, and are brought forth in early summer or spring. They are then very slender, with large eyes and imperfectly developed fins, and are from ⅕ to ¼ inch in total length.

156. **Sebastichthys flavidus** (Ayres) Lockington.—*Yellow-tail.*

From San Diego to Cape Mendocino; very abundant in Monterey Bay and about San Francisco. It is found in both deep and shallow water, and is taken in large numbers with gill-nets and set-lines. Like all the species of the genus, it feeds on crustacea and small fish. This species is one of the larger ones of the genus, reaching a weight of 6 or 7 pounds. It is considered as one of the best of the group.

157. **Sebastichthys melanops** (Grd.) Gill.—*Black Bass.*

From Monterey northward; most common in Puget Sound; not very abundant about San Francisco, but frequently seen in the markets. In size, habits, and value not essentially different from *S. flavidus*, with which species its affinities are closer than with *S. mystinus.*

158. **Sebastichthys mystinus** J. & G.—*Black Rock-fish; Pêche Prêtre; Black Bass.*

From San Diego northward; more common about Monterey and San Francisco than either northward or southward. It is found in rather shallow waters, and is mostly taken in gill-nets. It reaches a weight of 5 pounds, and from its color is less salable than the others of the group, although the flesh is probably similar. It is probably sent to San Francisco in greater numbers than any other species.

159. **Sebastichthys entomelas** J. &. G.

Known only from Monterey, where it is taken with hook and line in deep water. Thus far the least abundant of the species. Similar in size and value to *flavidus.*

160. **Sebastichthys ovalis** (Ayres) Lockington.—*Viuva.*

From Santa Barbara to Monterey; taken with hook and line in very deep water; one of the least abundant species. Similar in size and value to *S. flavidus.*

161. **Sebastichthys proriger** J. & G.

About Monterey and the Farallones; taken with the next species in very deep water; not rare in its haunts. .One of the smallest species, not weighing more than 1½ pounds. In quality similar to other small red species.

162. **Sebastichthys elongatus** (Ayres) Gill.—*Reina.*

About Monterey and San Francisco; abundant in very deep water with the preceding. It is a small species, reaching a weight of 2 pounds, and being handsomely colored is one of the most salable species. It is not very common in the markets except in spring.

163. **Sebastichthys atrovirens** J. & G.—*Garrupa; Green Rock-fish.*

From San Francisco to San Diego; abundant about rocky places in rather shallow water. Taken in considerable numbers in gill-nets, especially south of Point Concepcion. Many of them are taken in the winter about the Santa Barbara Islands, and a good many are dried and salted by the Chinamen. It reaches a weight of 3 pounds, and is graded with *flavidus* and *nebulosus.*

164. **Sebastichthys pinniger** (Gill) Lockington.—*Fliaume; Red Rock Cod.*

From Monterey northward; abundant everywhere in deep water and taken in great numbers, chiefly with set-lines, not often with gill-nets. This is probably the most abundant red species in the San Francisco markets, and many are split and salted in the deep waters of Puget Sound. It is a large species, reaching a weight of 8 or 10 pounds. It sells as well as the other red or green species, unless too large, when the flesh is rather coarse.

165. **Sebastichthys miniatus** J. & G.—*Rasher; Rasciera.*

From Santa Barbara to San Francisco; found with the preceding, but often in water less deep. It is taken with hook and line and gill-nets, and is sent into the market of San Francisco in large numbers. It reaches the same size as the preceding, and is equally valuable.

166. **Sebastichthys ruber** (Ayres) Gill.—*Red Rock Cod; Rock-fish; Tambor.*

From Santa Barbara northward; most abundant in Puget Sound and about San Francisco; taken with hook and line in deep water. Large specimens seen about Victoria with the skull above infested by an encysted parasitic worm. One of the most abundant species in the San Francisco markets, and probably reaches the largest size of any—10 to 12 pounds. The large ones are very robust in form. It grades with *pinniger* and *miniatus*, from which it is not distinguished by the trade.

167. **Sebastichthys rubrivinctus** J. & G.—*Spanish Flag.*

From Santa Barbara to Monterey, about the reefs in very deep water; occasionally taken with hook and line in spring. It reaches a weight of 6 pounds. In beauty of coloration it surpasses all other fish on the coast.

168. **Sebastichthys constellatus** J. & G.—*Bagre.*

From Santa Barbara to San Francisco, in deep water; taken with hooks only; rather abundant and frequently seen in the market. It reaches a weight of 2 or 3 pounds, and ranks with *rosaceus* and other small species, and, like them, spawns at Monterey in early spring.

169. **Sebastichthys rosaceus** (Grd.) Gill.—*Corsair.*

From San Francisco to Santa Barbara (*San Diego*, Grd.), on reefs in deep water; where found the most abundant of the red species. It is one of the smallest species, rarely weighing over 1½ pounds, and is taken to the San Francisco market in great numbers.

170. **Sebastichthys rhodochloris** J. & G.—*Fly-fish.*

Monterey and the Farallones, where it occurs in deep water with the preceding in considerable abundance, and with it is occasionally sent in large numbers to the San Francisco market in the spring.

171. **Sebastichthys chlorostictus** J. & G.—*Pesce Vermiglia.*

Known from Monterey and the Farallones, where it occurs in considerable abundance with the three preceding species. It is a larger fish, reaching a weight of 4 pounds.

172. **Sebastichthys caurinus** (Rich.) J. & G.

Puget Sound northward; in habits and value similar to its Southern representative *S. vexillaris*.

173. **Sebastichthys vexillaris** J. & G.—*Red Garrupa.*

San Diego to Puget Sound; generally abundant along the coast in water of moderate depth. Taken chiefly with nets. Many are sent to the San Francisco market, it ranking with abundance only behind *ruber*, *pinniger*, *rosaceus*, *flavidus*, *mystinus*, *auriculatus*, and *carnatus*. It is one of the larger species, reaching a weight of 5 or 6 pounds.

174. **Sebastichthys auriculatus** (Grd.) Gill.—*Rock-fish.*

Santa Barbara to Puget Sound; everywhere one of the most abundant species, and always the one most frequently taken near shore. It is the only one frequenting, habitually, shallow bays and taking the hook around wharves. It is common in the San Francisco markets and reaches a weight of 3 pounds, although usually taken in San Francisco Bay at half a pound weight. It is less valued than the deep-water species as food.

175. **Sebastichthys rastrelliger** J. & G.—*Garrupa; Grass Rock-fish.*

From Humboldt Bay southward; abundant about the Santa Barbara Islands, where it is taken with hooks and gill-nets, but rarely with seines. It occurs in considerable numbers in the San Francisco markets. It reaches a weight of 2½ pounds, and is esteemed as the best of the family as food.

176. **Sebastichthys maliger** J & G.

From Monterey northward, in rather deep water; commonest in the Straits of Fuca, where it is taken with hook and line. It is occasionally seen in the San Francisco markets, but is one of the less common species. It is one of the largest species, reaching a weight of 6 pounds.

177. **Sebastichthys carnatus** J. & G.—*Garrupa.*

From Santa Barbara to San Francisco; abundant at Monterey, where it is taken in great numbers in rather shallow water with gill-nets. At Santa Barbara it is rare, and it has not been noticed northward. It reaches a weight of 2½ pounds, and grades with *atrovirens*, *flavidus*, *nebulosus*, etc., as fairly good.

178. **Sebastichthys chrysomelas** J. & G.—*Garrupa.*

From Santa Barbara to San Francisco; rather less abundant than the preceding and found in rather deeper water. Otherwise very similar in size and habits.

179. **Sebastichthys nebulosus** (Ayres) Gill.—*Garrupa; Rock Cod.*

From Monterey to Puget Sound; rather common, and becoming abundant northward. It occurs in water of moderate depth and is taken by means of hooks and gill-nets. It is rather common in the markets of San Francisco, and reaches a weight of 3½ pounds.

180. **Sebastichthys serriceps** J. & G—*Tree-fish.*

From San Diego to San Francisco; abundant about Catalina Island in rather deep water among rocks; less common northward, but occasionally seen in the San Francisco markets. It reaches a weight of about 3 pounds.

181. **Sebastichthys nigrocinctus** (Ayres) Gill.

Monterey to Puget Sound; rather abundant in the Straits of Fuca in very deep water; rare about San Francisco, and only occasionally taken with a hook and line in deep water. It is one of the most striking species in color, and hence preferred by buyers. It reaches a weight of 4 pounds.

182. **Scorpæna guttata** Grd.—*Scorpene; Sculpin; Scorpion.*

Santa Barbara southward; very abundant in rocky places, and often in bays and shallow water. It feeds on crustacea and spawns in spring. It is esteemed as one of the best of food-fishes. It reaches a weight of rarely more than 1½ to 2 pounds. A wound from its dorsal spines is extremely painful for a time, like a poisoned sting.

## Family COTTIDÆ.

183. **Nautichthys oculofasciatus** Grd.

From San Francisco northward, rare; occasionally taken in Puget Sound in rather deep water. It reaches a length of 6 to 8 inches.

184. **Blepsias cirrhosus** (Pallas) Gthr.

From San Francisco northward, scarce; not rare in Puget Sound, where it is sometimes taken in seines. It reaches a length of about 6 inches. Like the preceding, it is occasionally preserved as a curiosity

185. **Oligocottus analis** Grd.—*Little Scorpion.*

From Monterey to Lower California; common in rock-pools, and extremely active. It reaches a length of about 4 or 5 inches.

186. **Oligocottus maculosus** Grd.—*Johnny.*

From San Luis Obispo to Alaska; exceedingly abundant northward, in rock-pools and among stones close to shore in sheltered bays. One of the most abundant species on the coast so far as the number of individuals is concerned. It reaches a length of 2½ inches, being the smallest of our marine *Cottidæ.* It is subject to great variations in color, dependent on the character of its surroundings.

187. **Blenniocottus globiceps** (Grd.) Gill.

From Monterey to Puget Sound and northward, in rock-pools, with the preceding. Its motions are, however, much less active. It is nowhere abundant. It reaches a length of 5 inches.

188. **Liocottus hirundo** Girard.

About Santa Barbara and the islands; taken with hook and line; rare. It reaches a length of about 7 inches.

189. **Leptocottus armatus** Grd.—*Sculpin; Drummer.*

Entire coast; everywhere abundant in lagoons, sheltered bays, and muddy bottoms. It feeds on crustaceans, and takes the hook readily. It reaches a length of a foot, and is held in no esteem. Some are dried by the Chinese, who consider it one of the least valuable fishes. Its movements are in general more active than those of most sculpins.

190. **Scorpænichthys marmoratus** Grd.—*Sculpin; Capisone; Salpa; Biggyhead.*

Entire coast; very abundant about San Francisco, becoming less common north and south, but seen by us at Victoria and San Diego. It lives in the kelp, at moderate depths, and is taken with the hook or gill-net. It is a coarse, dry fish, held in very low esteem, and not sent to the market from any great distance. It reaches a length of about 2 feet and a weight of 8 to 10 pounds, being much the largest of the Cottoids on this coast.

191. **Aspicottus bison** Grd.—*Stone Sculpin; Salpa.*

San Francisco northward; exceedingly abundant in Puget Sound in rocky places, and among weeds at small depths in sheltered bays. At Seattle the most abundant of the family. Less common at San Francisco. It feeds chiefly on *Ulva* and other green plants, of which its long intestines are always full. It takes the hook readily with any sort of bait, and therefore probably does not disdain animal food. It reaches a length of about a foot, and is seldom used for food. The European *Cottus bubalis* Euphrasen, with which this species is considered identical by Dr. Günther, is a true *Cottus*, and has no intimate relation to *Aspicottus bison.*

192. **Hemilepidotus trachurus** (Pallas) Gthr.

From San Francisco northward, in similar situations with the preceding, but much less abundant. It feeds chiefly on crustacea. It reaches a length of about 15 inches, being, next to *Scorpænichthys*, the largest Cottoid of our west coast. It is rarely used as food.

193. **Hemilepidotus spinosus** Ayres.—*Capisone; Cabezon.*

About San Francisco and Monterey, where it is rather common. Taken chiefly by the Chinese on set-lines in rather deep water. It reaches a length of 9 inches, feeds on crustacea, and is held in no esteem as food.

194. **Artedius pugetensis** Steind.

Puget Sound; not abundant. It feeds on crustacea, etc. It reaches a length of about 9 inches, and is seldom used as food.

195. **Artedius megacephalus** Lochington.—*Chitonotus megacephalus* Lochington. Mining and Scientific Press, San Francisco, 1879.)

Deep water off San Francisco. Distinguished from the preceding by the greatly-elevated anterior portion of the spinous dorsal, the first spine reaching past the front of the soft dorsal. Specimens numbered 27,185, from Point Reyes, lately distributed by the National Museum as *Artedius pugetensis*, belong to this species.

196. **Artedius quadriseriatus** Lockington.

Only seen about San Francisco, where it is very common in deep water off Point Reyes, being brought in by the sweep-nets, mixed with tom-cod and prawns. It reaches a length of less than 3 inches.

197. **Artedius notospilotus** Grd.—*Sculpin; Drummer; Salpa.*

Santa Barbara to Puget Sound, most abundant at Santa Barbara. It lives in the kelp, in water of moderate depth, and is mostly taken with the hook. It reaches a length of 4 to 5 inches, and is little esteemed.

198. **Artedius lateralis** Grd.

Monterey to Puget Sound, inhabiting the rock-pools with the species of *Oligocottus;* not common anywhere. It reaches a length of about 4 inches. It is readily distinguished from the preceding by the larger mouth and the naked, smooth head.

199. **Cottus polyacanthocephalus** Pallas.—*Sculpin; Bull-head.*

Puget Sound and northward; generally abundant; not seen southward. Carnivorous. It reaches a length of 15 inches or more, and although of considerable size is not often used as food. There is much waste in a sculpin, the removal of the head and skin leaving very little meat, and that little comparatively is coarse and dry.

200. **Ascelichthys rhodorus** J. & G.

At Waada Island and other points at the entrance of the Straits of Fuca; exceedingly abundant among the rocks at low tide. Specimens in Mr. Lockington's collection from Gualala, Mendocino County, California. Carnivorous, reaching a length of 3½ inches.

201. **Psychrolutes paradoxus** Gthr.

Puget Sound and northward; a specimen from the Aleutian Islands is in the Museum of the Alaska Commercial Company. It reaches a length of 2 inches.

## Family AGONIDÆ.

202. **Bothragonus swani** (Steind.) Gill.

Not seen by us; the original specimen from Port Townsend.

203. **Podothecus trispinosus** (Lockington) J. & G.

San Francisco to Santa Barbara; occasionally brought in among prawns to the markets of San Francisco; one specimen dredged at Santa Barbara. It reaches a length of 3 inches.

**204. Podothecus vulsus** J. & G.

About San Francisco in the open sea. Brought into market occasionally with prawns, and sometimes taken in sweep-nets by the paranzelle, which are large fishing-boats, sailing in pairs before the wind, drawing a large net behind and between them on the bottom. It reaches a length of 4½ inches.

**205. Podothecus acipenserinus** (Pallas) Gthr.

Puget Sound and northward; abundant; taken frequently in seines in water of moderate depth. It reaches a length of about a foot.

**206. Brachyopsis xyosternus** J. & G.

Bay of Monterey; abundant in June along the shore about Soquel; not seen elsewhere; taken in seines. It reaches a length of 5 or 6 inches.

**207. Brachyopsis verrucosus** Lockington.

Point Reyes to San Francisco; occasionally brought into the markets with tom-cod or prawns, many being taken in the sweep-nets. It reaches a length of 6 to 8 inches.

**208. Aspidophoroides inermis** Günther.

Described from the Gulf of Georgia; not seen by us.

## Family TRIGLIDÆ.

**209. Prionotus stephanophrys** Lock.

One specimen known, from off Point Reyes.

## Family LIPARIDIDÆ.

**210. Liparis pulchellus** Ayres.

About San Francisco and Monterey, and probably northward, but not seen by us elsewhere. Taken occasionally with seines at Soquel, and sometimes brought into the San Francisco market. It reaches a length of 5 or 6 inches.

**211. Liparis, cyclopus** Günther.

A single young specimen obtained by us at Monterey.

**212. Liparis mucosus** Ayres.

About San Francisco, and probably northward. It reaches a length of 5 or 6 inches.

## Family CYCLOPTERIDÆ.

**213. Eumicrotremus orbis** (Gthr.) Gill.

Described from Esquimault Harbor; not seen by us on the coast. A specimen is in the Museum of the Alaska Commercial Company from the Aleutian Islands.

## Family GOBIESOCIDÆ.

214. **Gobiesox reticulatus** (Grd.) J. & G.—*Sucking-fish.*

From Monterey northward to Puget Sound;' not noticed southward; very abundant at Point Pinos, and about Cape Flattery, where it lives among the rocks between tide-marks. Its motions in the water are active, but it is usually found clinging to stones. It feeds on small shells and crustacea, and reaches a length of 5 to 6 inches.

215. **Gobiesox rhessodon** Rosa Smith Mss.

Under rocks at Point Loma, near San Diego; locally rather abundant.

## Family BLENNIIDÆ.

216. **Hypleurochilus gentilis** (Grd.) Gill.

From Santa Barbara southward; not rare in rock-pools between tide-marks, among algæ. It reaches a length of 5 inches.

217. **Neoclinus blanchardi** Grd.

From Monterey southward, in the kelp; taken occasionally with hook and line. Feeds chiefly on crustacea. It reaches a length of 7 to 8 inches. Seen by us at Monterey, San Luis Obispo, and Santa Barbara.

218. **Neoclinus satiricus** Girard.

Monterey southward; rare. Seen by us at Monterey, only. It reaches a length of a foot, and lives in the kelp.

219. **Heterostichus rostratus** Grd.—*Kelp-fish.*

From Monterey southward; not rare in the kelp south of Point Concepcion. Taken with hook and occasionally with seines. It feeds on crustacea, etc. It reaches a length of about 15 inches. It is sometimes brought to market with other fish, but no special notice is taken of it.

220. **Gibbonsia elegans** Cooper.

From Monterey southward; abundant everywhere in kelp and rock-pools. It reaches a length of 8 inches, and is not noticed by the fishermen.

221. **Cremnobates integripinnis** Rosa Smith.

San Diego to Mazatlan; the specimens from our coast found in rock-pools near La Jolla, 12 miles north of San Diego, among algæ between tide-marks. Length 2½ inches.

222. **Muræenoides ornatus** (Grd.) Gill.—*Eel.*

San Francisco northward; abundant in Puget Sound. Found in rock-pools in sheltered places and sometimes taken in seines. It reaches a length of a foot. It is not considered a food-fish. The form called *M. lætus* is considerably more abundant than the typical *ornatus*. They two differ only in the form of the dorsal blotches and are, probably, not distinct species.

**223. Apodichthys fucorum** J. & G.

Monterey to Puget Sound; very abundant at Point Pinos; less common about Cape Flattery. It is very abundant in the *Fucus* between tide-marks, especially where thick bunches of the slender *Fucus* hang from rocks into a little pool of water. At Monterey large numbers may often be shaken from a tuft of *Fucus*, at considerable distance from the water. Its movements are exceedingly active, more so than those of other eel-shaped blennies. It reaches a length of 5 or 6 inches.

**224. Apodichthys flavidus** Grd.

San Luis Obispo to Puget Sound, in rock-pools and in the kelp. Frequently taken with seines. It reaches a length of over a foot, and is remarkable for its brilliant colors, which vary from bright green to orange and violet with its surroundings. It feeds, like the three preceding species, on crustacea and small shells.

**225. Anoplarchus alectrolophus** (Pallas) J. & G.

From Monterey northward; most abundant in Puget Sound. It inhabits the region between tide-marks, where it is sheltered from the surf. It is usually found among weeds and stones where the bottom is very muddy. It reaches a length of about 8 inches. Pyloric cœca are present in this species, as in the species of *Xiphister* and *Cebedichthys*. They are wanting in *Apodichthys* and *Murænoides*.

**226. Xiphister chirus** J. & G.

From Monterey northward; more abundant about Puget Sound. It inhabits the region about low-tide mark, among rocks or mussel shells which are exposed to the action of the waves. Like the others of the genus it is strictly herbivorous, feeding on red or green algæ. It reaches a length of 6 to 8 inches.

**227. Xiphister mucosus** (Grd.) Jor.

From Monterey northward; everywhere very abundant among loose rocks between tide-marks. It feeds on algæ, and reaches a length of about 20 inches. Occasionally brought into the San Francisco market, where it sells at 30 cents per pound.

**228. Xiphister rupestris** J. & G.

From Monterey northward; everywhere very abundant with the preceding. It reaches a length of about a foot.

**229. Lumpenus anguillaris** (Pallas) Gill.—*Eel.*

From Northern California northward; exceedingly abundant in Puget Sound, where it inhabits sandy shores in water of moderate depth. It feeds chiefly on algæ. It reaches a length of 20 inches. It is occasionally brought into the markets, but is not valued as food, and apparently seldom eaten, its looks being against it.

230. **Anarrhichthys ocellatus** Ayres.—*Eel; Morina; Azia; Wolf Eel.*

From Monterey northward; not rare, but not very abundant. It feeds on crustacea and fishes. It reaches a length of 8 feet and a weight of at least 25 pounds. It is sent to the markets and brings a fair price.

### Family BATRACHIDÆ.

231. **Porichthys porosissimus** (C. & V.) Grd.—*Mud-fish; Cat-fish; Drummer; Singing fish.*

Exceedingly abundant the entire length of the coast in shallow, muddy, or weedy bays, often under stones. It reaches a length of somewhat more than a foot, and is never used as food.

### Family ZOARCIDÆ.

232. **Lycodopsis paucidens** (Lockington) Gill.

San Francisco and northward; not very common; brought in with the tom-cod taken in sweep-nets off Point Reyes. It reaches a length of about 10 inches. No notice is taken of it as a food-fish.

233. **Lycodopsis pacificus** Collett.

San Francisco northward, with the preceding; abundant in Puget Sound. Distinguished only by the smaller head and mouth.

### Family CONGROGADIDÆ.

234. **Scytalina cerdale** J. & G.

In loose stones near low-tide mark, on Waada Island, near Cape Flattery. It reaches a length of about 6 inches. It is exceedingly active in life.

### Family OPHIDIIDÆ.

235. **Ophidium taylori** Grd.

San Francisco to Santa Barbara; not very common; taken in sweep-nets with tom-cod, etc., about San Francisco, and sometimes brought into the markets. It reaches a length of about 14 inches, and no special notice is taken of it.

### Family BROTULIDÆ.

236. **Brosmophycis marginatus** (Ayres) Gill.—*Cusk; Mustela.*

San Francisco and northward; rare; occasionally brought into the San Francisco market, and from its bright colors readily salable. It reaches a length of nearly 18 inches.

### Family GADIDÆ.

237. **Microgadus proximus** (Grd.) Gill.—*Tom Cod; Whiting.*

Monterey to Puget Sound; very abundant from San Francisco northward, and taken in immense numbers in seines and sweep-nets. Its flesh is somewhat watery and tasteless, yet it meets with a ready sale. It reaches a length of about a foot and a weight of about ½ pound.

**238. Gadus morrhua** L.—*Alaska Cod.*

Straits of Fuca and northward; abundant on certain banks; probably occurring off the coast of Oregon.

**239. Pollachius chalcogrammus** (Pallas) J. & G.

(*Gadus periscopus* Cope.)

Monterey and northward; occasionally taken with hook in deep water about Seattle with *Bathymaster signatus*; very rare about San Francisco. It reaches a length of about 2 feet.

**240. Merlucius productus** (Ayres) Gill.—*Merluccio; Horse Mackerel.*

Santa Cruz Island northward; very abundant at certain seasons, especially at its spawning time in the spring, when it is taken in great numbers in the gill-nets at Monterey, Soquel, and elsewhere. Its distribution is irregular, being very abundant some years but at other times extremely scarce. It is extremely voracious, feeding on all sorts of small fishes and squids, its stomach being always full. It ranks low as a market fish, as its flesh is extremely soft, and it is always ragged-looking when shipped. It reaches a length of rather more than 2 feet and a weight of 10 pounds.

## Family PLEURONECTIDÆ.

**241. Atheresthes stomias** J. & G.

San Francisco and northward; the only specimens taken by us were from between Point Reyes and the Farallones. It reaches a length of 30 inches and a weight of 5 or 6 pounds, being probably the slenderest flounder known.

**242. Hippoglossus vulgaris** Fleming.—*Halibut.*

From San Francisco northward; not abundant south of the Straits of Fuca. There is a large halibut bank near Cape Flattery, and considerable numbers are taken in the deeper channels of the sound by means of hook and line. It reaches a length of 5 or 6 feet and a weight of 200 pounds or more. It feeds on codfish and any other large fish which it can take. Its flesh is much esteemed.

**243. Xystreurys liolepis** J. & G.

Santa Barbara and southward; not very rare, in moderately deep water and about the kelp. It reaches a length of about 14 inches and a weight of a little over 2 pounds.

**244. Paralichthys maculosus** Grd.—*Monterey Halibut; Bastard Halibut; Flounder.*

(*Uropsetta californica* Gill.)

Tomales Bay southward; abundant from Monterey to San Diego, being the most abundant flounder south of Point Concepcion, the young swarming in all the bays, the adult comparatively rare. It reaches a length of nearly 3 feet and a weight of 60 pounds, the largest seen by us weighing 55 pounds. The large ones are taken chiefly in gill-nets. As a food-fish it is considered rather inferior to the others, the large ones being tough and coarse.

245. **Hippoglossoides jordani** Lockington.—*Sole; Soglia.*

Monterey to Puget Sound; rare northward, but very abundant about San Francisco. At Monterey it is the most abundant species. It is considered one of the best of its family. Great numbers are salted, hung up by the tails, suspended above the roofs, and dried, by the Chinese. It reaches a length of 18 inches and a weight of 3 to 5 pounds.

246. **Hippoglossoides elassodon** J. & G.

Puget Sound and northward; not uncommon about the wharves of Seattle and Tacoma, where it is taken with hook and line. It reaches the length of about a foot and a weight of at least 2 pounds.

247. **Hippoglossoides exilis** J. & G.

San Francisco to Puget Sound, in deep water. Taken about Point Reyes with sweep-nets, at certain times, in enormous numbers. Less common about Seattle. A small species; none seen over 9 inches in length, weighing about ¾ pound. It is not valued, the flesh being soft. Most of those taken by the paranzelle are thrown away.

248. **Psettichthys melanostictus** Grd.—*Sole.*

From Monterey to Puget Sound; everywhere common, but not so abundant as some other species. It is considered the best of the flounders for the table. It reaches a length of nearly 20 inches and a weight of 4 to 5 pounds.

249. **Citharichthys sordidus** (Grd.) Gthr.—*Plaice.*

Entire coast; most abundant northward; rather rare south of Point Concepcion. It frequents rather deep water, and is best taken with hook or sweep-net. It is one of the smaller species, rarely weighing more than 1½ pounds, and its flesh is comparatively soft. Many are dried by the Chinese, who do not find it necessary to hang them up as in the case of the larger "sole", but dry them upon tables.

250. **Parophrys isolepis** (Lockington) J. & G.—*Sole.*

From Monterey to Puget Sound, in rather deep water; not rare; large numbers are brought into the San Francisco market, being taken in the sweep-nets about Point Reyes. It reaches a length of 15 inches and a weight of 3 pounds, although usually much smaller.

251. **Parophrys ischyrus** J. & G.

Puget Sound; not common; the four specimens seen taken near Seattle with a seine. It reaches a length of 18 inches and a weight of about 4 pounds.

252. **Parophrys vetulus** Grd.—*Sole.*

Santa Barbara to Alaska; very abundant from Monterey northward to Puget Sound. It is usually one of the smallest species, reaching a length of about 14 inches and a weight of 2 or 3 pounds. Most of those seen in the markets weigh about half a pound. It is one of the principal market species, and usually sells well.

253. **Lepidopsetta bilineata** (Ayres) Lock.—*Rock Sole.*

Monterey to Alaska; rather common about rocky places, and abundant in Puget Sound; considerable numbers are taken with set-lines by the Chinese at Monterey. It reaches a length of 18 inches and a weight of 3 to 5 pounds.

254. **Pleuronectes stellatus** Pallas.—*Flounder.*

From San Luis Obispo northward; everywhere very abundant, especially northward and about the mouths of rivers; the commonest flounder on the coast. It is reckoned a good food-fish when not too large. It reaches a length of 2 feet and a weight of at least 10 pounds.

255. **Glyptocephalus zachirus** Lockington.—*Sole.*

About San Francisco and Monterey, in rather deep water; taken chiefly with the sweep-nets, its mouth being too small for the hook and its habitat too deep for the gill-nets. It reaches a length of 18 inches and a weight of about 2 pounds, and is considered excellent food.

256. **Cynicoglossus pacificus** (Lock.) J & G.—*Sole.*

Monterey to Puget Sound, in rather deep water; generally abundant; taken chiefly in the sweep-nets. Rather common at Seattle, and often brought in immense numbers from the sweep-nets to the San Francisco markets. It spawns in May and June. It reaches a length of a little more than a foot and a weight of 2 pounds. This species is excessively slimy when taken out of the water. It is considered as a good food-fish when large. The small ones, taken so abundantly, are little valued.

257. **Hypsopsetta guttulata** (Grd.) Gill.—*Turbot; Diamond Flounder.*

Tomales to San Diego; widely distributed, but not so abundant anywhere as most of the other species. Considerable numbers are brought to the San Francisco market, but none have been noticed by us in Monterey Bay. It reaches a length of nearly a foot and a weight of about 3 pounds.

258. **Pleuronichthys cœnosus** Grd.

San Diego to Alaska, in deep water; not very abundant anywhere south of Puget Sound, where it is quite common. It is chiefly herbivorous, like the other species of the genus, and with them spawns in May to July. It reaches a length of about a foot and a weight of 2 to 3 pounds. It is rarely seen in the San Francisco markets.

259. **Pleuronichthys decurrens** J. & G.

Monterey and San Francisco (and northward?), in deep water. Large numbers taken in sweep-nets about the Farallones and brought into the San Francisco markets. In size, food, and habits similar to the preceding, but more abundant.

260. **Pleuronichthys verticalis** J. & G.

Monterey and San Francisco, in deep water; taken at Monterey in considerable numbers in the spawning season by means of gill-nets. It is similar in size, feed, and habits to the others, but most specimens seen in the markets are of smaller size.

261. **Aphoristia atricauda** J. & G.

Numerous specimens, 3 to 5 inches long, taken at San Diego.

## Family AULORHYNCHIDÆ.

262. **Aulorhynchus flavidus** Gill.

Monterey to Puget Sound, in large schools in sheltered bays near the shore; not common southward. It reaches a length of 5 to 6 inches.

263. **Gasterosteus microcephalus** Grd.—*Stickleback.*

(*Gasterosteus plebeius* and *pugetti* Grd.)

In rivers and brackish waters from Los Angeles River to Puget Sound; commonest southward. Length 2 inches.

264. **Gasterosteus aculeatus** var. **cataphractus** (Pallas) J. & G.—*Stickleback; Salmon Killer.* (*Gasterosteus serratus* Ayres; *Gasterosteus insculptus* Rich.)

In salt water, entering rivers from San Francisco to Alaska; very common northward. Length 2½ inches.

## Family SYNGNATHIDÆ.

265. **Siphostoma californiense** (Storer) J. & G.—*Pipe-fish.*

Santa Barbara to Puget Sound; the form called *S. griseolineatus* from San Francisco northward, the other southward and generally common; most common at Soquel. It reaches a length of 15 to 18 inches.

266. **Siphostoma leptorhynchus** (Grd.) J. & G.

Santa Barbara to San Diego; not very common except in San Diego Bay. It reaches a length of less than a foot.

267. **Siphostoma punctipinne** (Gill) J. & G.

Only the original types, from San Diego, are yet known.

## Family HIPPOCAMPIDÆ.

268. **Hippocampus ingens** Grd.—*Sea Horse.*

San Diego; rare. Reaches a length of about a foot.

## Family TETRODONTIDÆ.

**269. Cirrhisomus politus** (Ayres) J. & G.

Not obtained by us. A specimen in collection of California Academy, from San Diego.

## Family DIODONTIDÆ.

**270. Diodon maculatus** Lac.

One specimen, from near San Diego.

## Family ORTHAGORISCIDÆ.

**271. Mola rotunda** Cuvier.—*Sunfish; Mola.*

Abundant in Santa Barbara Channel in summer; often seen playing near the surface, and even leaping from the water; not often taken, as they are not easily caught and not used for food. Reaches a weight of 200 pounds or more.

UNITED STATES NATIONAL MUSEUM,
*December* 1, 1880.

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# DESCRIPTION OF SEBASTICHTHYS MYSTINUS.

## By DAVID S. JORDAN and CHARLES H. GILBERT.

**Sebastichthys mystinus.**

*Sebastes variabilis* Ayres, Proc. Cal. Acad. Nat. Sci. i, 7, 1854 (not of Pallas, = *Epinephelus ciliatus* Tilesius).

*Sebastodes melanops* Ayres, Proc. Cal. Acad. Nat. Sci. ii, 216 (in part; probably not the figure 66, which more resembles *S. melanops;* not *Sebastes melanops* Girard, = *Sebastosomus simulans* Gill).

*Sebastichthys melanops* Jordan & Gilbert, Proc. U. S. Nat. Mus. iii, 1880, 289, and elsewhere.

*Sebastichthys mystinus* Jordan & Gilbert, Proc. U. S. Nat. Mus. iii, 1880, 445; 1881, 8.

Two species have been confounded by previous writers under the name of *Sebastes* or *Sebastosomus melanops.* The one, darker in color, with smaller mouth and black peritoneum, is found from Puget Sound to San Diego, being most common southward, and is perhaps the most abundant species of the genus on the coast. The other, paler and more spotted, with larger mouth and white peritoneum, ranges from Monterey to Sitka, being most common northward. The first is the "Pêche Prêtre" of the Monterey fishermen, the second the "Black Bass" of the anglers of Puget Sound. The first is referred to by us as *Sebastichthys melanops* on page 289 and elsewhere in these Proceedings (Vol. III); the second as *Sebastichthys simulans.* The original description by Girard of his *Sebastes melanops,* however, can refer only to the second fish, as is shown by the following statements (U. S. Pac. R. R. Expl. Fishes, 81):

"Upper surface of head spineless;" "the posterior extremity of the maxillary, very much dilated, extends to a vertical line drawn inwardly to the posterior rim of the orbit." "The pectorals are broad; * * * the tip of these fins extends almost as far as the tip of the ventrals." "The upper surface of the head and of the dorsal region above the lateral line are almost black, or else of a purplish black. The side of the body is yellowish, with an irregular purplish black spot upon nearly all the scales. The side of the head is of a lighter purplish black. The inferior region is of a soiled yellow, though of a metallic hue. The fins are unicolor, of dark purple tint." The "Pêche Prêtre" has a preorbital protuberance, which usually ends in a spine; the "Black Bass" has neither protuberance nor spine. The mouth is smaller in the "Pêche Prêtre", the maxillary barely extending to the posterior margin of the pupil. The pectoral fins are longer in the "Pêche Prêtre", extending past the tips of the ventrals; in the other not so far. And, finally, omitting the expression "purplish", which scarcely applies to any rock-fish, the account of the color describes the "Black Bass", but not the "Pêche Prêtre".

Furthermore, the original type of Girard's description, the large specimen from Astoria, is still preserved in the National Museum, and its identity with the species formerly called by us *S. simulans* is undoubted. The original type of the name *Sebastosomus simulans* is also preserved. It belongs to the same species, differing only in having the lower opercular spine somewhat less conspicuous than usual. The northern fish, the "Black Bass" of Puget Sound, must, therefore, retain the name of *Sebastichthys melanops*, of which name *simulans* is a synonym, while the "Pêche Prêtre" may receive the new name of *Sebastichthys mystinus*. *Sebastichthys ciliatus* (*Epinephelus ciliatus* Tilesius = *Perca variabilis* Pallas) is related to both species, but distinct from both, having the black peritoneum of *mystinus*, but lacking the bulge of the preorbital region. The mouth is larger than in *mystinus*, but smaller than in *melanops*, while the coloration is different from both.

### DESCRIPTION OF SEBASTICHTHYS MYSTINUS.

Body oval-oblong, compressed, both dorsal and ventral outline evenly curved. Head conic, compressed, the profile almost straight. Mouth comparatively small, oblique, the lower jaw protruding; mouth entirely below the axis of the body; premaxillaries on the line of the lower rim of the orbit; maxillary thickly scaled, reaching to opposite posterior margin of pupil; mandible scaly.

Top of head without spines, with the exception of the very small nasal pair, and sometimes a preocular pair; the interorbital space perfectly arched, and the entire top of the head covered with very small, crowded scales; the preocular ridge forming a projection over the upper anterior angle of the orbit. The forehead between the preocular ridges is notably full and convex. The occipital ridge forms two slightly diverging ridges under the scales. Preorbital with a small spine, which is sometimes obsolete.

Preopercle with rather strong spines, the two at the angle longest. Opercle with two strong spines. Suprascapular spines present.

Gill-rakers numerous, long and very strong, their length half the diameter of the eye, their number about $\frac{8}{23}$.

Scales smaller than in most of the species, in about 66 transverse series.

Spinous dorsal low, the fourth to seventh spines highest, all lower than the soft dorsal, the fin not deeply emarginate. Third anal spine slightly longer than the second, but not so strong. Caudal fin emarginate. Pectoral fins long, reaching beyond the tips of the ventrals to the base of the tenth dorsal spine. Ventrals not reaching to the vent.

Fin rays: D. XII, I, 15; A. III, 9.

Color slaty black, becoming lighter below the lateral line. Belly scarcely pale. Sides often somewhat mottled. Tip of lower jaw black. Top of head with three indistinct cross-bars: one in front of eyes, continued around anterior rim of orbit, and extending backwards across the cheeks; one between the orbits, reappearing below in a second oblique cheek-band; the third across occiput, extending obliquely backwards to the upper angle of the opercle. Fins plain dusky.

Peritoneum black, as in *S. ovalis*, *S. entomelas*, and *S. ciliatus*. In *S. melanops* and its near relative *S. flavidus* the peritoneum is always white.

UNITED STATES NATIONAL MUSEUM, *January* 5, 1881.

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## DESCRIPTION OF A NEW SPECIES OF PTYCHOCHILUS (PTYCHOCHILUS HARFORDI), FROM SACRAMENTO RIVER.

### By DAVID S. JORDAN and CHARLES H. GILBERT.

**Ptychochilus harfordi**, sp. nov.

Allied to *Pt. oregonensis* (Rich.), but with much smaller scales.

Body long and slender, little compressed, the back not elevated, the caudal peduncle large and stout. Greatest depth of body contained 5¾ times in its length from snout to base of caudal. Head long, pike-like, subconic, rather slender, broad and depressed above. Length of head contained 4 times in length to base of caudal Mouth terminal, oblique, the lower jaw somewhat projecting. Premaxillary anteriorly on the level of the eye. Maxillary, as in other species, closely adherent to the preorbital, except near its end, where it slips under the preorbital, its tip extending just beyond the vertical from the front of the eye. Length of cleft of mouth contained 2⅔ times in length of head. Interorbital width 3¾ times in the length of head. Eye small, placed high, its diameter contained 3 times in the length of the snout, 10 times in that of the head. Cheeks very broad. Lips normal, as in other species of the genus. Gill-rakers very short. Pseudobranchiæ large. Gill-membranes in one specimen united and wholly free from the isthmus; in the others joined as usual in *Cyprinidæ*. The condition in the first specimen is doubtless abnormal. Pharyngeal bones and teeth as in the other species of the genus; the teeth 2, 4–5, 2, slender, hooked, without grinding surface.

Scales 17–90–9, those on the back and belly rather smaller than the others, those on the breast imbedded. Lateral line very strongly decurved, its lowest point scarcely above the line of insertion of the pectoral fins.

Dorsal fin inserted at a point midway between eye and base of caudal, a little behind the insertion of the ventrals. Caudal short and deep, not strongly forked, the lobes equal, the accessory rays not numerous. Pectorals not large, extending three-fifths the distance to the ventrals, which reach two-thirds the distance to the vent. Anal fin small. Dorsal rays I, 8; anal I, 7.

This species reaches a length of nearly 3 feet. It is brought into the markets of San Francisco in considerable numbers in the winter, in company with the closely related and still larger species *Ptychochilus oregonensis* (*Pt. grandis* Ayres), with which species it has been hitherto confounded. The latter species is, however at once distinguished by its larger scales, the usual number being 12–75–6. *Ptychochilus rapax* Grd. has the larger scales of *Ptychochilus oregonensis*, and the lateral line is represented as little decurved, the scales more loosely imbricated; and *Pt. lucius* Grd., from the Colorado River, is represented as having the scales still smaller than in *Pt. harfordi*, while "*Ptychochilus vorax* Grd." is not a member of this genus at all, but belongs to the group called *Gila*.

We have named this species for Mr. W. G. W. Harford, curator of the California Academy of Sciences, who has taken much interest in the development of the ichthyology of California, and to whom the National Museum has been indebted for many favors.

The typical specimens, four in number, are entered as No. 27246 on the Museum Register. The largest one is about 18 inches in length, the others a little smaller. They were obtained by the writers in the San Francisco market, and were taken in the Sacramento River.

UNITED STATES NATIONAL MUSEUM, *January* 5, 1881.

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## NOTE ON RAIA INORNATA.

### By DAVID S. JORDAN and CHARLES H. GILBERT.

Four species of the genus *Raia* are known from the Pacific coast of the United States. One of these was described by Girard, under the name of *Raia binoculata*, in the Proc. Acad. Nat. Sci. Phila., 1854, p. 196, and later under the name of *Uraptera binoculata*. The description contains little that is characteristic, and the typical example seems to be lost. We have, however, no doubt that it was based on a young individual of the large skate called by us, on page 252 and elsewhere in these Proceedings (Vol. III), *Raia cooperi.* The presence of the single spine on the median line of the back anteriorly, as described by Girard, is one of the most constant diagnostic characters of the young of this species, and we have never found less than three or four such species in the corresponding position in the species called by us hitherto *Raia binoculata.*

The *Raia cooperi* of Girard is based on a drawing by Dr. Cooper, and the great size is the only diagnostic character assigned to it. As three of the species reach a length of but 30 inches and the other a length of 6 feet, we have no difficulty in making an identification with the species described by us as *Raia cooperi* on page 252. *Raia binoculata* of Girard is thus probably the young of *Raia cooperi* of Girard. The large skate should therefore be called *Raia binoculata*, while the species described by us on page 134 of the Proceedings as *Raia binoculata* may receive the new name of *Raia inornata.*

Specimens of this species obtained at Santa Barbara represent a marked variety, distinguished by the small number and feebleness of the spines and prickles, and in the presence (in the females) of a band of small prickles on the posterior part of the pectorals, parallel with the edge. Suprocular spines almost obsolete. Two or three minute prickles often present on the median line at the shoulders. A series of minute stellate prickles beginning near the middle of the back, becoming hooked spines on the tail. Lateral caudal spines scarcely developed, even in the female. A band of small prickles on the posterior part of the back. Males almost smooth. Size and color as in *R. inornata.* This form may be known as var. *inermis.*

UNITED STATES NATIONAL MUSEUM, *January* 13, 1881.

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## ON THE FISH-MORTALITY IN THE GULF OF MEXICO.

### By ERNEST INGERSOLL.

SIR: Pursuant to your verbal suggestion, I made it an object, during my recent cruise down the western coast of Florida in the service of the Superintendent of the Census, to inquire into the so-called "poisoned water" which was supposed to have caused the remarkable mortality among the sea-fishes that occurred in the autumn of 1880. I am sorry to be able to give so meagre an account of the matter as follows; but must beg excuses on the plea that I was too late to see any actual destruction, since the cause had wholly disappeared previous to my arrival there, and also from the fact that I was unable to carry out my intention of going to Key West, where most of the fishermen live who suffered injury, and who could perhaps have furnished additional information.

It appears that this misfortune is not a new experience in the eastern part of the Gulf of Mexico. One of the oldest residents on the Floridan coast, Mr. Benjamin Curry, of Manatee, told me, what others confirmed, that as far back as 1844 a wide-spread destruction of all sorts of salt-water animal life occurred, apparently due to causes precisely similar to those which produced the lately noticed desolation. Again, in 1854 the fishes suffered all along the southern shore, and have done so at intervals since to a less degree, until in 1878 an excessive fatality spread among them, which was wider in the extent of its damaging effects and probably more destructive in point of number of victims than the later visitation of 1880. Even the cooler half of 1879 was not exempt from some appearance of the plague.

In regard to some of the manifestations of this deadly influence in the sea during 1878, Mr. John Brady, jr., an intelligent captain, told me that the time of year was January, and that the "poisoned water", to which universal belief credits the death of the fishes, could easily be distinguished from the clear blue of the pure surrounding element. This discolored water appeared in long patches or "streaks", sometimes 100 yards wide, drifting lengthways with the flow of the tide. The earliest indication of it was the floating up of vast quantities of dead sponges—chiefly "loggerheads". All those seen by Mr. Brady were less than 40 miles north of Key West, in what is known as "The Bay", nor has anything of the sort been seen at any time outside (*i. e.*, southward or eastward) of the Florida Reefs; but it was soon discovered that all the hitherto profitable sponging grounds lying off the coast as far north nearly as Cedar Keys, and particularly off the Anclotes, had been ruined. These grounds are only now beginning to show signs of reproductiveness in sponges. At the same time, many portions of this area—for example, Sarasota Bay—seem not to have been affected, sufficiently at least to cause the death of swimming fishes to any great extent. In the case of the sponges, only a few of other species than the loggerhead would be seen floating; but when they were hooked into, all were found dead, though still clinging to the bottom. When a sponge dies naturally it gradually becomes white at its base, through the loss of its sarcodal matter, but all these were observed to have turned black. The abandonment of these sponging grounds from the Reefs to Cedar Keys, during the three or four years following this attack, entails a loss which it is hard to estimate, because partially compensated in the increased price of the article in the market due to its consequent scarcity, and because at all times the product there is an uncertain quantity; but I hazard the opinion that $100,000 would not repair the damage to this business interest alone. Had it not been for the fortunate discovery just at that time of the sponge-tracts off Rock Island, northward of the Suwanee River, almost a famine in this article would have ensued.

Concerning the attack of 1880 I am able to say more. It began suddenly, and immediately followed the terrible hurricane which is known as the "August gale", the fish and all other ocean life suddenly dying in hordes all along the southern (eastern) shore of Tampa Bay, on Egmont Key, at its mouth, which was the most northern point, and thence southward as far as Shark River, in Whitewater Bay, on the coast. Thence fatal localities were to be found in the currents that set southward through Bahia Honda Passage, through the Northwest Passage beyond Key West, and even out in the neighborhood of the far-isolated Tortugas.

Everywhere throughout this whole extent of coast, except in the mouths of the rivers and in the shallow bayous, all the forms of sea-life died as though stricken with a plague fatal alike to all, and were drifted upon the beaches in long windrows so dense that near human habitations men were obliged to unite in burying them to prevent a pestilential stench, or to haul them away by wagon-loads to be prepared for manure, as was done in some cases. Not only were swimming fishes destroyed, but sponges, crabs (I saw upon the beaches thousands of horseshoe-crabs laden with their chains of undischarged eggs), and great numbers of mollusks. The oysters at the mouth of Manatee River and in Tampa were spoiled (in imagination if not in fact!), and the excellent clams of Sarasota Bay became weak, tasteless, and of a repulsive green hue at their edges. A graphic account has been given me in a letter received from Mr. Charles Moore, jr., keeper of the light-house on Egmont Key, at the entrance of Tampa Bay, the original of which I transmit herewith. This point witnessed the height of the calamity, and as Mr. Moore was present during the whole season, his account of facts is valuable. Mr. Moore writes:

EGMONT KEY, FLA., *February* 20, 1881.

SIR: As I promised to give you all the information about the fish dying at this station, I will do so to the best of my ability. The first dead fish we saw was on Sunday, October 17, as the tide came in. There were thousands of small fish floating on the water, most of them quite dead. I saw only one kind the first day; they were small fish, four or five inches long; the Key West smackmen called them "brim". They were a new fish to me. The next day other kinds were dying all along the shore; the pompano was about the next to give in, and by the 25th October nearly all kinds of fish that inhabit these waters were dying, except the ray family. I don't remember of ever seeing any stinger or whipper ray, or the devil-fish, as we call the largest ones of the ray family. From the 25th of October to the 10th of November was the worst time; during that time the stench was so bad that it was impossible to go on the beach. I sent my family to Manatee, and the assistant keeper and myself shut ourselves up in our rooms and kept burning tar, coffee, sulphur, rags, etc., night and day in order to stand it. It was warm, damp, and calm weather. They continued to die for about six weeks; they kept getting less every day. I counted seventy sharks within 80 yards, all small; I never saw a shark over four feet long dead. The cow-fish and eels were about the last to die. In regard to the cause of their dying, I have made up my mind it was caused by the fresh water, as there was immense quantities of fresh water coming down the bay, and the water here was nearly fresh on the surface, while the water underneath was perfectly salt. Now, if the fresh water could have passed off into the Gulf without being disturbed by winds, and it would have naturally spread out thinner and thinner as it would have rolled on towards the Gulf Stream, and once it got there, then there would have been no trouble. But on the 7th of October we had a heavy gale from the southwest, and it continued to blow from the south and west until the 11th of October, and a very heavy sea running at the mouth of the bay, and it *churned* the fresh and salt water all up together, and the strong southerly winds set this mixed water back and kept it here for several days. I noticed, a few days before the fish commenced to die, a peculiar smell on the water, something like the smell of bilge-water, and the color of the water was a dirty green, mixed with small sediment. I noticed the fish while they were dying, when they first come in shoal water; they would act crazy, dart around in every direction, but in a short time would give up and float ashore. On examining them I found their gills all glued together with a slimy substance and of a whitish color,* and in a short time the gills would turn green and the fish bloat very large. I cannot make any correct statement as to the number that died, but thousands of barrels floated up on this island. There are no fish dying now; all we catch are fat and nice. I should have written to you before, but I have been very busy. I've had a new duty to perform, taking the tide every half hour. Any information I can give you at any time I will be happy to do so.

My address is: Braidentown, Manatee County, Florida.

Very respectfully,

CHARLES MOORE, JR.,
*Keeper of Egmont Light-House.*

ERNEST INGERSOLL,
*U. S. Fish Commission,*
*Washington, D. C.*

Along this region of the Florida coast are several establishments or "factories" devoted to the catching and salting of fish, chiefly the mullet and its roe, and to the making of superphosphates. All of these were obliged to suspend operations, and their winter's work has been ruined, or at least all the profits are gone. One gentleman told me of a single definite loss he had thus suffered of $800.

To this part of the coast, also, comes a large fleet of smacks and "smackees" every winter to catch fish for the Key West and Havana markets, principally the latter. These smacks found that, as before, the brownish, discolored water, "thick and glutinous" (as one described it), which seemed the cause of the mischief, lay in streaks drifting with the tide. The small fishes that swam into one of these patches (which had a vertical thickness apparently coextensive with the depth of the sea at that place) seemed unable to get out before they were stupefied, and died as though by suffocation. Even the large carnivorous swimmers, like the sharks and porpoises, often suffered the same fate, though frequently they would have strength to turn back and flounder out. In the pure element, between the deadly streaks, fish were as abundant as ever at the distance from the coast where the smacks operated, and their wells were often filled with promptness; but it was found that it was impossible, even by going straight out to the Tortugas, to run the gauntlet of the poisoned water floating between there and Cape Sable, since if once it was encountered, and entered the well, a very few minutes sufficed to bring about the death of every fin of the cargo. I have a few notes, culled from the Key West journals, which show that a loss of nearly $10,000 resulted from only four or five such misfortunes. The consequence was that for some weeks the fishing throughout all that part of the Gulf had to be wholly abandoned, involving the idleness of a large number of vessels and their crews.

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*I failed to find any other instance in which this thickening or begumming of the gills had been observed. The dead fish were elsewhere reported as healthy in appearance, and in one case, at least, were eaten without harm, or even indigestion occurring.—E. I.

Seeking an explanation of the phenomenon, I everywhere asked what was the local theory to account for the matter, and was almost always told with confidence that it was due to an overflow of swamps and the pouring into the Gulf of bodies of fresh water poisoned by a decoction of noxious "acids", etc., leeched from the roots which had been soaking for years in the pent-up floods—a theory which I fail to find supported by such facts as I have been able to learn.

Those who *do* put faith in the sufficiency of this explanation, point out that the winter of 1877–'78 was unusually wet, and that this last fall saw more rain falling in South Florida than ever before in the recollection of the people there. This is probably true; and it may be, as asserted, that the years heretofore when fish have died have been those noted for their excessive rainfall, but I have not compared meteorological records. It is no doubt true also that if a sea-fish should be plunged into water saturated with the tannin derived from decomposing roots and stems of palmetto, oak, sumach, etc., which do abound in the Everglades, he would find it eminently unhealthy. But further than this the hypothesis will not hold. It requires us to believe that the overflow of a small surface of swamp-land shall so tincture the wide area of the Gulf as to destroy its healthfulness through several weeks, while the tides are ceaselessly swinging back and forth, and rapid currents continuously replace the water of every part with new and send the old elsewhere. This is preposterous. Moreover, provided it was true of the Manatee River (as is claimed), or of the Caloosahatchie farther south, why should it not equally be true of the Atlantic coast, where there is the same or greater drainage, yet no such trouble known; or of the Withlacoochee, Suwanee, and a dozen other streams draining swamps like the Ofeekinofee, in whose tangled recesses grow plants as noxious as those farther south, yet whose discharging currents do no harm to the fishes? Moreover, in the Manatee River itself no fish were killed above the free range of the tides, though daily breasting the swamp overflow.

Some, discarding any theory of the decoction of poison from plants as an explanation, will tell you that the excess of rainwater discharged by the rivers so freshened the surf as to cause the death of all shore-swimming fishes. This, as near as I can make it out, is Mr. Moore's explanation of the mortality at Egmont Key.

In a few confined spots, where fishes could not escape at will, this might now and then cause a death; but it is notorious that the fishes of the Gulf coast make little or no distinction between salt and fresh water. Alligators swim to the outermost keys, and the best sheepshead caught are those far up the Caloosahatchie, where the stream is always sweet, while the porpoise and shark chase the mullet away in toward the head of the bayous, or until the river-channel gets too shallow for them to swim farther. A little fresh water, or a good deal, more or less, would receive no attention whatever from a Floridan fish. The Mississippi has been deluging the Gulf with a well-nigh Amazonian volume of water, fresh not only, but thick and nasty, yet no one supposes the fishes off the delta are obliged to stay in its murky flood unless they choose, or, if they do, that they suffer by it, except to the palate of the epicure.

But a more cogent argument, from facts perhaps overlooked heretofore, exists against any theory which seeks to explain the destruction of marine life inside the Florida reefs by any landward agency. This is that it was in all cases the dwellers on the bottom that perished first, while the surface-feeders were the last to be affected, and as a rule escaped altogether. (Until 1880, I was told, no mullets were ever known to be killed.) It was the death of sponges, conchs, sea-anemones, crawling horseshoe-crabs, of toad-fish, cow-fish, skates, and the like, which keep close down on the bottom, that first apprised the fishermen of the presence of their dreaded and mysterious enemy. Next came the bodies of red-fish, groupers, pompanos, and other deep swimmers, and last of all a few mullets and sharks. Fresh water, tinctured with tannin or untinctured, would not effect this. It would float on the surface, having a lesser density. If it exerted a noxious influence it would be the surface-life that would first succumb, the bottom-life longest escape. But quite the reverse has been the case, and this, with other appearances, leads to the conclusion that the "poison" springs from the bottom of the sea, or is formed in its waters.

The only way to account for this is by supposing that eruptions of volcanic gases may have taken place through the bottom of the sea along a line stretching from Tampa Bay to the Tortugas, and through the western half of the Florida Keys. Inquiring as well as I could whether there had been any evidences of plutonic action in that region within a few years, I heard a tradition that about the holidays of 1877–'78 an earthquake shock had been felt on the west coast. I have had no opportunity, as yet, to verify this, but it is a well-known fact that just previous to the hurricane of last August, so well remembered by all the people of Florida West as a time of almost unparalleled destruction of shipping and height of tidal waves, a shock of earthquake was felt throughout the whole southwestern end of the peninsula. It did considerable damage in the city of Key West, and was so alarming at Tampa that several persons ran in a fright from their houses. Immediately after it, began the sudden destruction of fish I have described.

Whether the physical shock of such an occurrence, touching the fish and creepers on the bottom, would do them harm, or whether the subsequent patches of "poisoned water" owed their discoloration and undoubted deleterious properties to being saturated with sulphurous or carbonic-acid gases derived from subterranean vents, I cannot presume to decide. But if the last supposition had been proved true, or shall be at some future time, would it not be a rational and sufficient explanation of the death of the fishes, sponges, and their kin, whenever they came in contact with the discolored water alluded to?

Analysis of the suspected water would have done more to solve the question, probably, than anything else can do, and it is a matter of continued regret that I could not obtain specimens of it for that purpose. After the end of September, however, the evil diminished, and by Christmas all of the harmful water had disappeared from the Gulf.

Regretting that I could not have done more to get at the truth of the matter, in essaying which I was offered every aid by the citizens of Florida, but continually impeded by bad weather and other untoward circumstances, I beg to submit this little that I have learned; and I have the honor to be,

Very respectfully yours,

ERNEST INGERSOLL.

Professor SPENCER F. BAIRD,
*United States Commissioner of Fish and Fisheries,*
*Washington, D. C.*

# NOTES ON SALMONIDÆ OF THE UPPER COLUMBIA.

## By CAPT. CHARLES BENDIRE, U. S. A.

[NOTE.—The United States National Museum has lately received from Captain Bendire a very fine series of fishes from the neighborhood of Fort Walla Walla, by far the most valuable collection of fishes ever made in the waters of the Upper Columbia. The series is especially valuable, as it throws much light on the life history of the Blue-back Salmon or "Red-fish" (*Oncorhynchus nerka*), and shows, apparently beyond a doubt, what no one had before suspected, so far as I know, that the supposed land-locked little red salmon (*Oncorhynchus kennerlyi*) is nothing but the young breeding male or grilse of the *Oncorhynchus nerka*. Accompanying the collection are many valuable field-notes on the different species. Those relating to the Salmon and Trout are here extracted, each paragraph being preceded by my identification of the species to which the remarks refer.—D. S. JORDAN.]

*a.* **Oncorhynchus nerka** (Walb.) Gill & Jor.

(Adults in spring dress; the ordinary "Blue-back" of the Lower Columbia.)

Species of Salmon, ♀ and ♂, caught in the Columbia River near Wallula, Wash., July 7, 1880. Local name, Silver Salmon. Some 250 miles farther up the Snake River the same fish (at least I have every reason to believe it to be the same fish) are called Blue-backs or Steel-backs. This is undoubtedly the same species which during the spawning stage is known as the Red-fish found in the Wallowa Lake, Oregon, and Payette and Salmon Lakes, Idaho Territory.

*b.* **Oncorhynchus nerka.**

(Young male, exactly like the types of *Salmo kennerlyi* Suckley.)

A very interesting specimen. I take this to be a two-year old Red-fish, the only one of this size seen or caught. It was very deep for its size, and resembles, as nearly as I can recollect, the type of *Salmo kennerlyi* very much. It was caught on a hook by one of Mr. Messenger's men September 1, 1880, and is the only one of the size ever observed by any of them. Color bluish black above, silvery white on lower parts.

*c.* **Oncorhynchus nerka.**

(Young, not yet showing hooked jaws.)

Young Red-fish. In some back steel-blue, in others back bluish and greenish bronze; sides lilac-colored, showing almost all the colors of a rainbow; bellies silvery white; iris silvery with black centre. In life one of the handsomest little fish I have ever seen. Some specimens show spots of a bluish-black color like trout on the head and near the tail and caudal fin, a few only along the whole back. Most of these spots disappear shortly after death, but in some I noticed them some hours after capture. These fish are all about the same size, and, strange to say, they seem to be all males,* and the milt often flows from them while being taken from the hook, through squeezing them.

*d.* **Oncorhynchus nerka.**

(Adult in September; "Red-fish.")

Description and color notes taken of several specimens, just as they came out of the water, showing the differences in individuals. All were from Wallowa Lake, Oregon, caught with a seine near the head of the lake August 31 and September 1, 1880.

No. 1, ♂. Upper half of sides and back bright scarlet red, posterior parts shading off to a bright crimson; the two upper fins same color as the back, lower fins bluish on lower parts, the upper ends greenish olive; belly bluish; whole upper part of head light greenish yellow, showing in strong contrast to the body; base of upper jaw steel-blue, lower jaw bluish white.

No. 2, ♂. Upper parts claret-color, slightly brighter about the caudal region, otherwise marked like No. 1. Top of head light yellowish green, the yellow predominating, this color extending to and below the eye, and backwards to end of gills, a deep olive green darker than the upper parts of head, giving this specimen a very peculiar appearance; belly bluish white.

No. 3. Upper parts a very deep purple; lower parts of belly a deep bluish lead-color, otherwise marked like No. 2.

No. 4, ♂. Small. Presumably just arrived at the lake. In this specimen the hooked nose is not as fully developed as in the preceding ones, and the characteristic red of this species is obscured and partly hidden by a bluish tint. The hump is not yet developed on the back, and if it was not for the slightly hooked nose this specimen might readily be taken for a female. Belly silvery white beneath, slightly tinged with blue on the sides. Iris silvery.

The females are much more uniformly colored. The head is considerably tinged with steel-blue and the red tint on the sides is more or less clouded with blue and bronze. Females after spawning show considerable amount of red, only after spawning I noticed that the red coloring matter deposited in the skin appears to be drawn from the flesh, and I find that in proportion to the bright coloring of the skin of the fish the flesh loses this tint. In some instances it is barely pink-colored or almost white. After the spawning of these fish they are brightest outside and palest inside (as far as the flesh is concerned). The average size of a number of males by actual weight is only 5 pounds, and of females only 3¾ pounds. After death within half an hour the color of these fish rapidly changes about the head and becomes a dark olive green with bluish reflections, in some instances almost bluish black.

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* One female less than a foot long was found in the lot. The eggs were well developed, though few in number.—D. S. J.

Among any number of fish there is an almost endless variation in color, caused, perhaps, by some remaining a longer time in the lake than others. Wallowa Lake is about 4¼ miles in length by 1½ to 2 miles wide. It deepens very rapidly out a few feet from the shore, and is said to be 400 feet deep, and more than that in places. Two small streams flow into the lake, and these form the spawning ground proper for these fish; and as there are falls about two miles above the mouth of these streams over which the fish cannot leap, they are restricted to rather limited quarters for spawning. The only place I saw any of these fish was on the bar near the head of the lake, and there most of them are caught. They can be seen in schools of 100 or more at almost any time during the month of August and later. This year the run has been very light, and fishing had to a great extent stopped when I arrived at the lake on the last day of August. Four fisheries had been in operation, and these had put up about 20,000 pounds of fish. I believe two or three years ago it had been the practice to obstruct the entrances to the small streams at the head of the lake to prevent the fish from running up these streams. This year this was not done, and a number of the settlers about the lake seem to be anxious to have the fish properly protected, and it is not at all too soon to do it, either. The placing of obstructions in the above-mentioned streams, and perhaps this year of gill nets on the bar, has no doubt something to do with the scarcity of these fish. But the most abominable things of all which I saw personally in use are several clusters of hooks tied together, so that they form a circle with a radius of about 3 inches. Just above these hooks a lump of Red-fish eggs is laid. These are covered with mosquito-netting, and by this contrivance thousands of young Red-fish (the settlers call them "shiners," others call them "trout," but I am satisfied that it will be found that they are yearling Red-fish*) are caught and salted as well as the full-grown ones. Now, these fish are only about 4 inches long, and for every one caught two are crippled and die. So it can readily be seen that an immense number are destroyed yearly, as some parties make it a business to salt these down as well as mature fish.

I examined all these modes of fishing, and when I hooked with a single hook about one out of three in some other part of the body than the head, it can readily be understood how murderous such a contrivance as the above must be, and how many young fish can be destroyed by a single person in a day. They bait them first, and when they become plenty use their grappling hooks.

The fishermen at the lake complain that the Indians destroy the fish, but from personal observation I can't at all agree with them. It is true that numbers of Indians come from various parts of the country to Wallowa Lake yearly to fish, and they catch a good many. While I was camped at the lake I examined the catch of every Indian that passed my camp, and I looked at as many as fifty Indians a day; each one had from six to twelve fish usually tied on his horse, and I found that there was about one female to ten males, and most of these were spent fish which had already spawned. They are not at all particular about this, and a fish which may be all bruised up and skinned is apparently just as well relished by them as a perfectly sound one, and even these Indians appreciated the fact that it would not do to catch too many females; at any rate they told me that as a rule they let the females go, and this is a good deal more than most of our white fishermen are willing to do. Mostly every one out here now concedes that the Red-fish is not a resident of the lakes wherein it is found, and I am perfectly satisfied that they are anadromous and not land-locked. The only thing as yet which I can't understand is, how do they get rid of the hooked nose and the hump after going back to salt water? They surely can't all die after spawning, and sometimes one that weighs as much as ten pounds is caught, and this fish is certainly older than a five-pounder; and it would not be presuming too much to assert that a Salmon of that size must have made more than one trip to sea. While in the lake they do not appear to eat anything, and the stomachs of several which I examined were entirely empty. I cannot understand how they get rid of their long hooked nose and hump.

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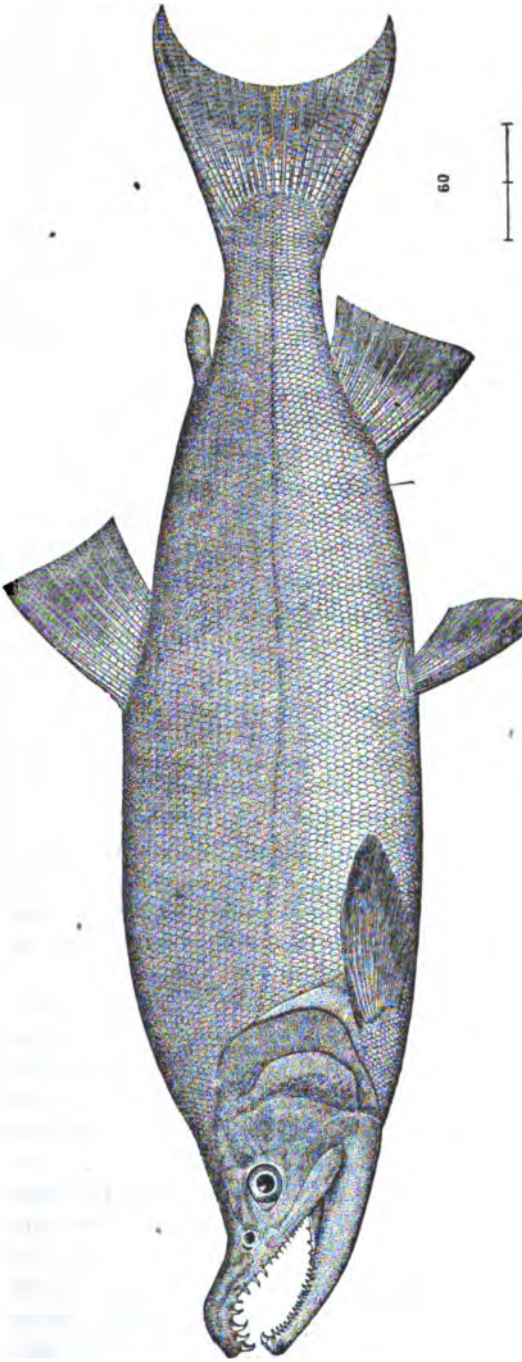
* No doubt of it.—D. S. J.

*e.* **Oncorhynchus chouicha** (Walb.) Jor. & Gilb.

(Quinnat or Chinnook Salmon; a young male corresponding to the "*kennerlyi*" stage of the Red-fish.)

*Salmo quinnat* ♂. A very small specimen. If not a true Chinnook Salmon, it was at least in company with several of this species. The back of this one was olive green, spotted like a trout, with round and also irregularly-shaped black spots; sides greenish white. It was shot with several others in Bear Creek, Oregon, September 4, 1880.

I was very sorry that I had not the means to preserve a pair of large Salmon which I had, but I had no room in the large tank, and these fish were too large to go in if I had the room. A male specimen measured 46½ inches. Back brownish black, merging into a deep olive green on the sides, spotted with well-defined black spots on back, upper part of the sides, and caudal fins; a large bright purple patch, some 8–9 inches long, 2½ to 3 wide, on the lower anal region from the ventral fin back to tail. Belly very pale olive green and whitish. The female measured 37½ inches; colored like the male, but without any trace of red whatever. These fish had not spawned as yet, September 4. The red about the anal region is much more perceptible in large specimens than in small ones. None of the females (three) showed any red on them; all the larger males did, excepting the specimen I put up. The fish were all in good condition, none bruised and skinned up, the way I have seen them on the headwaters of the Salmon River. The Indians catch but few of these Salmon, preferring the Red-fish, which, from its small size, is easier cured; partly smoked and dried. Now and then, I am told, these Salmon run up the Wallowa River to the entrance of the lake, but invariably turn back again as soon as they strike the deep water. I cannot vouch for the truth of this, but every one of the fishermen claims that the principal spawning grounds of the Chinnook Salmon, in the vicinity of Lake Wallowa, are near the head of the South Fork of the Wallowa River, and in Bear Creek, Oregon. But these fish arrive in smaller numbers every year, and are diminishing even more rapidly than the Red-fish.



Male Red-fish received from Capt. Bendire, Oct., 1879.

*f.* **Salmo purpuratus** Pallas.

Trout called Salmon-Trout at Fort Cœur d'Alene. Belly silver white, a red stripe along the side, head and back steel-blue, with small black spots scattered over head and back. Small specimens have also a few black spots under the red stripe; these are found mostly towards the head.

*g.* **Salmo purpuratus** Pallas.

Called a Mountain Trout; ♂ weight 7 pounds 2 ounces, length 24½ inches. I opened this fish yesterday, September 18, to show him, and see that it has greatly changed. No red was visible whatever on the sides when caught. The back was bluish horn color with black crescent-shaped spots, sides and belly silvery white. Three larger specimens than this were caught in Wallowa Lake this season by Mr. Messenger; one weighing over 10 pounds. I had another one which weighed 4¼ pounds, but had no room for it in the collecting tank, and therefore had it cooked.

*h.* **Salmo purpuratus** Pallas. *Var.* Bouvieri Bendire.

(A variety singularly colored, but not evidently different otherwise.)

Trout from Waha Lake, 14 miles from Fort Lapwai, Idaho Territory. This lake has no visible outlet, is about 3 miles long by 1½ miles wide, and is situated on the northern slope of Craig's Mountain. I frequently fished in this lake in the years 1869 and 1870, when stationed at Fort Lapwai, Idaho Territory, and never heard of any other kind of fish being found in said lake. All the fish caught there are about the same size, from 6 to 10 inches long. I believe it is a new species or variety, as no similar looking Trout are found in the streams or lakes in the neighborhood.

Back bluish green, olive color, sides silvery; in some instances the whole belly is red, in others the sides only; a few show a yellowish tinge; no red on the sides. There are round black spots near the tail, and fainter ones on the flanks. A few have an occasional spot on the head; two vermilion-colored stripes on each side of the under jaw; fins edged with brick red, ranging from this color to an orange.

Caught August 21, 1880.

This lake is very deep, and the water clear and cold. A smaller lake situated only some 400 yards from Lake Waha, and of somewhat lower altitude, contains no fish whatever.

*i.* **Salvelinus malma** (Walb.) Jor. & Gilb.

Bull Trout, Cœur d'Alene Lake, August 5. The Bull Trout with one exception were caught by Drum Major Sattors, Second United States Infantry, and I am indebted to Capt. William Mills and First Lieut. John K. Waring, Second Infantry, for several fine specimens of Trout and use of their boats.

According to the general testimony of all the officers, at the time I was at the lake, the fishing there was very poor, at least as far as size is concerned, the largest specimen not weighing over 2½ or 3 pounds, but it seemed to me that fish weighing one pound and upwards were very plenty. The lake, no doubt, contains some large fish, particularly among the Bull Trout, of which specimens have been caught weighing 10 pounds and over. These were, at the time of my visit, very scarce, and were supposed to have gone up some of the numerous streams to spawn.

The Bull Trout seems to bear his name all over this section of country, while for the others there are numerous names, no two parties agreeing.

The more I see of these Trout, the less hopeful I become of adding new species among this family, and I do not believe that over four* different kinds are to be found in this upper country.

*j.* **Salvelinus malma.**

Bull Trout, Cœur d'Alene Lake, August 5. Belly silver white; back and upper parts grayish, spotted with round pink markings; head darker than the back, which seems to be bluish black.

# A REVIEW OF THE GENERA AND SPECIES OF THE FAMILY CENTRARCHIDÆ, WITH A DESCRIPTION OF ONE NEW SPECIES.

### By CHARLES L. McKAY.

The object of this paper is to give a catalogue of the genera and species of Centrarchidæ recognized by me, in anticipation of a monographic review of the family which I hope to publish at some future time. The results here obtained are based on a study of all the specimens of Centrarchidæ in the United States National Museum and in the collection of Professor Jordan. Types of nearly all the nominal species thus far described have been examined and compared, and I believe that very few of those here mentioned will prove invalid. The species not examined by me are designated by a star (*).

## 1. Genus CENTRARCHUS C. & V.

1. **Centrarchus macropterus** (Lac.) Jor. = *C. irideus* C. & V.

The characters assumed to distingush *C. macropterus* and *C. irideus* disappear on examination of a large series.

## 2. Genus POMOXYS Rafinesque.

2. **Pomoxys sparoides** (Lac.) Girard. = *Centrarchus hexacanthus* Cuv. & Val.

3. **Pomoxys annularis** Raf.

## 3. Genus ARCHOPLITES Gill.

4. **Archoplites interruptus** (Grd.) Gill.

## 4. Genus AMBLOPLITES Rafinesque.

5. **Ambloplites rupestris** (Raf.) Gill. = ? *A. cavifrons* Cope.

## 5. Genus ACANTHARCHUS Gill.

6. **Acantharchus pomotis** (Baird) Gill.

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* *Oncorhynchus chouicha; O. nerka; Salmo purpuratus; Salvelinus malma. Salmo irideus* does not range so far to the northward, and *Salmo gairdneri* and the three other species of *Oncorhynchus* (*keta kisutch, gorbuscha*), do not ascend so far from the sea.—D. S. J.

### 6. Genus CHÆNOBRYTTUS Gill.

7. **Chænobryttus gulosus** (C. & V.) Jor. = *Centrarchus viridis* C. & V.; *Chænobryttus viridis* Jor.; *Lepomis gilli* Cope; *Calliurus floridensis* Holbr.

8. **Chænobryttus antistius** McKay, nom. sp. nov. = *Glossoplites melanops* Jor. Man. Vert. ed. i, p. 317, and *Chænobryttus gulosus* Jor., Ann. Lyc. Nat. Hist. 1876.

This species is best distinguished from the preceding by the position of the dorsal, the first spine being situated over the posterior margin of the opercular lobe, while in *C. gulosus* the first spine is situated directly over the posterior portion of the base of the pectorals. The only specimens of this species known to me are in the collection of Professor Jordan. The types are from Lake Michigan. There are smaller specimens in the collection from the Upper Wabash and the Illinois Rivers. I have examined specimens of *C. gulosus*, which is a southern form, in the National Museum, from each of the Southern States, from Texas to Virginia.

### 7. Genus LEPOMIS Rafinesque.

This genus, as understood by me, includes *Apomotis*, *Xenotis*, *Bryttus*, *Helioperca*, *Xystroplites*, and *Eupomotis* of authors. *Apomotis* has been separated from *Lepomis* on account of the large size of the supplemental maxillary. On careful comparison this is found to be scarcely larger than in one or two other species of *Lepomis*. It disappears by degrees, but seems to exist in all the species, though sometimes so small as to be inappreciable. I have even found it present in large specimens of *L. pallidus*. Its presence in the species is only a character of degree, therefore not generic. Till the group had been more fully studied, *Xenotis* was supposed to contain a large number of species, and was separated from *Lepomis* principally for convenience' sake, and on the slight character of the feeble gill-rakers. By the comparison of a very large series of the alleged species from Professor Jordan's collection I have come to the conclusion that they are all forms of a single species. The gill-rakers are usually rather more feeble than in the rest of the species of *Lepomis*, but this again is a question of degree. *Bryttus* has been distinguished from *Lepomis* by the presence of palatine teeth. This is also a character of degree, and is subject to the most perfect gradation. I have found it impossible to retain *Xystroplites* and *Eupomotis* also, as there is complete gradation in the character of the pharyngeals between *Lepomis* proper and *Xystroplites*, and again between *Xystroplites* and *Eupomotis* both as to the width and form of the bones themselves and the form of the teeth.

9. **Lepomis cyanellus** Raf.

10. **Lepomis symmetricus** Forbes, MSS. (in Jordan & Gilbert's Synopsis Fishes N. A. *ined.*).

11. **Lepomis phenax** (Cope & Jor.) McKay.

12. **Lepomis murinus** (Grd.) McKay.

Some of the types of *Calliurus murinus* Grd. belong to *L. cyanellus*, but the specimen figured by him in the U. S. P. R. R. Exp., x, pl. vii, Fig.

1, belongs to a different species, apparently distinct from all others known. Type B. & G. No. 415, U. S. Nat. Mus.

13. **Lepomis lirus** * McKay, nom. sp. nov. = *Pomotis pallidus* Ag. Not *Labrus pallidus* Mitch. Not *Eupomotis pallidus* Jor. which is *Lepomus notatus*. According to Professor Bliss (in letter to Professor Jordan), the pharyngeal teeth of this species are paved.

14. **Lepomis ischyrus** Jordan & Nelson.

15. **Lepomis macrochirus** Raf.

16. **Lepomis punctatus** (C. & V.) Jor. = *L. apiatus* Cope.

17. **Lepomis miniatus** Jordan.

18. **Lepomis humilis** (Grd.) Cope. = *L. anagallinus* Cope. Type No. 430, U. S. Nat. Mus. From Brazos R., Tex.

19. **Lepomis auritus** (L.) Raf.

19. *a* **Lepomis auritus var. solis** (C. & V.) McKay = *Lepomis rubricauda* Holbr.

The variety is the southern form, and is distinguished from the northern by having larger scales on the cheeks (usually 7 rows instead of 8) and in front of the pectorals, and usually a dark blotch on posterior margin of dorsal.

20. **Lepomis megalotis** (Raf.) Cope. = *Pomotis inscriptus* Ag.; *Lepomis peltastes* Cope.; *Xenotis aureolus* Jor.; *Xenotis solis* Gill & Jor.; *Xenotis lythrochloris* Jor.; *Ichthelis auritus* Raf.; *Pomotis sanguinolentus* Ag.; *Pomotis nitidus* Kirtland; *Pomotis popeii* Grd.; *Pomotis fallax* B. & G.; *Pomotis breviceps* B. & G.

21. **Lepomis marginatus** * (Holbr.) McKay.

22. **Lepomis elongatus** * (Holbr.) Gill & Jor.

23. **Lepomis pallidus** (Mitch.) Gill & Jor. = *Lepomis obscurus* (Ag.) Jor.

24. **Lepomis bombifrons** * (Ag.) Jor.

25. **Lepomis heros** (B. & G.) McKay = *Xystroplites heros*, Jor.

26. **Lepomis albulus** (Grd.) McKay.

The types of this species have been recently found and are identical with *Xystroplites gilli* Jor. Type No. 421, U. S. Nat. Mus. Rio Blanco, Tex.

27. **Lepomis euryorus** McKay. Sp. nov.

Body very robust, compressed. Form nearly oval; dorsal outline more convex than ventral. Antedorsal outline rather steep, slightly convex. Profile slightly depressed above eye. Mouth quite oblique, rather small; maxillary reaching to front margin of eye. Outer row of teeth on both jaws much stronger than the others. Teeth on vomer and front portion of palatines. Lower pharyngeals with the rather long posterior spur turned up; stoutish, the inner angle rounded, somewhat obtuse. Teeth stout, very much blunted, not close set; the inner considerably stronger and less blunt than the rest. The characters of the pharyngeals are those ascribed by Professor Jordan to the genus *Xystroplites*. Gill-rakers short, stout, nearly terete, about eight in number, the inner surface roughened, scarcely dentate. Branchiostegals six. Maxillary with a small but perfectly distinct supplemental bone. Eye very small, considerably less than length of snout (perhaps an individual character). Nostrils in line with pupil. Preorbital quadrate, mostly below line of pupil; preoperculum moderately large, lower angle rounded, very slightly obtuse. Scales on cheeks moderate, in six to seven rows. Opercle rather large, triangular, with the posterior angle produced into a rounded bony flap, nearly equaling the snout in length. The flap is of a shiny black color as in *L. cyanellus*, surrounded by a very broad membranous margin, which is white in the alcoholic specimen. Scales on the opercle large, in five rows. Suboperculum of nearly the same width throughout, with a single row of scales. Interoperculum wider than suboperculum, with about a row and a half of scales. Scales continued upwards a short distance between opercle and preopercle. Spine of the premaxillary stout and broad; width at base equal to one-third of interorbital space, moderately long, reaching to posterior nostril. Mucous channel from eye to suprascapular bone extremely narrow, scarcely separating the scales. Scales moderately large, ctenoid. Dorsal beginning over base of pectorals. Dorsal and anal somewhat obliquely opposed. Spinous portion of dorsal fin low, the longest spine reaching very little past margin of eye. Spines not very stout, nearly straight; all but the first two of nearly the same height. Soft portion of dorsal much higher than spinous, reaching greatest height at seventh and eighth rays, behind which it descends abruptly. Both caudal peduncle and fin short and stout. Soft portion of anal rounded. Insertion of ventrals behind base of pectorals, not reaching beyond vent. Pectorals short, only reaching vent. Scales in front of pectorals not much reduced, considerably larger than those on cheeks. The description of the species is taken from a single specimen, No. 4109, in the United States National Museum, from Fort Gratiot, Michigan, at the foot of Lake Huron.

*Table of Measurements.*

Species: *Lepomis euryorus.*

| Current number of specimen | 4109. | |
|---|---|---|
| Locality | Fort Gratiot, Michigan. | |
| Dimensions. | Inches and 100ths. | 100ths of length. |
| Extreme length | $6\frac{94}{100}$ | |
| Body: | | |
| Greatest height | | 43 |
| Greatest width | | 10½ |
| Least height of tail | | 13½ |
| Length of caudal peduncle | | 13½ |
| Head: | | |
| Greatest length without ear-flap | | 27½ |
| Distance from snout to nape | | 13 |
| Greatest width | | 16 |
| Width of interorbital area | | 10½ |
| Length of snout | | 9 |
| Length of ear-flap | | 8 |
| Length of maxillary | | 12 |

*Table of measurements*—Continued.

| Dimensions. | Inches and 100ths. | 100ths of length. |
|---|---|---|
| Head: | | |
| Length of mandible | | 12¾ |
| Diameter of orbit | | 6 |
| Dorsal (spinous): | | |
| Distance from snout | | 36 |
| Length of base | | 26 |
| Greatest height at fifth spine | | 9½ |
| Height at first spine | | 8¾ |
| Dorsal (soft): | | |
| Length of base | | 17¾ |
| Height at antecedent spine | | 8½ |
| Height at longest ray (the seventh) | | 17 |
| Anal: | | |
| Distance from snout | | 57 |
| Length of base | | 20 |
| Height at first spine | | 4½ |
| Height at third spine | | 10 |
| Height at longest ray (the fifth) | | 14½ |
| Caudal: | | |
| Length of external rays | | 16 |
| Pectoral: | | |
| Distance from snout | | 81 |
| Length | | 20½ |
| Ventral: | | |
| Distance from snout | | 38½ |
| Length | | 17 |
| Branchiostegals | | 6 |
| Dorsal | X, 11 | |
| Anal | III, 10 | |
| Number of scales in lateral line | | 43 |
| Number of transverse rows above lateral line | | 6 |
| Number of transverse rows below lateral line | 14–15 | |

**28. Lepomis gibbosus** (L.) McKay.

In the little-known eleventh or Halle edition of the Systema Naturæ of Linnæus, occur the following descriptions:

"Labrus auritus. L. cauda bifida, operculis branchiarum pinniformibus. D. $\frac{10}{21}$. P. 15. V. 6. A. 13. C. 17. *Habitat in* Philadelphia. *Mus. De Geer.*" (p. 283.)

"Perca gibbosa. P. pinnis dorsalibus unitis, cauda bifida, abdomine luteo, operculio striatis, apice nigro fulvoque. *Catesb. car.* 2. p. 8. t. 8. f. 3. Perca fluviatilis gibbosa, ventre luteo. *Habitat in* America." (p. 293.)

The description of *Perca gibbosa* refers of course to *Eupomotis aureus*, of authors, and the specific name of *gibbosus* must supersede *aureus* Walbaum 1792. In his twelfth edition Linnæus suppressed his *Perca gibbosa*, and referred Catesby's figure of *Perca fluviatilis gibbosa* with doubt, to the *Labrus auritus*. The description in the twelfth edition, as Professor Gill has shown, can refer only to *L. auritus*. The specific name, *gibbosus*, therefore, should be applied to *Eupomotis aureus* of authors, and *auritus* to the northern form of the other species.

29. **Lepomis holbrooki** (C. & V.) McKay = *Pomotis speciosus* Holbr.

30. **Lepomis notatus** (Ag.) McKay = *Eupomotis pallidus* Gill & Jordan.

Professor Jordan has received from the Museum of Comparative Zoölogy some of Agassiz's types of *Pomotis notatus*, which species proves on examination to be identical with *Eupomotis pallidus*, Gill & Jordan.

### 8. Genus MESOGONISTIUS Gill.

31. **Mesogonistius chætodon** (Baird) Gill.

### 9. Genus ENNEACANTHUS Gill.

This genus, as understood by me, includes *Hemioplites* and *Copelandia.* The genus *Hemioplites* was based by Cope on the presence of eight spines in the dorsal fin and four in the anal. I learn from Professor Jordan's notes that Cope's original type of *Hemioplites simulans* has really nine spines in the dorsal. Dr. Edward J. Nolan, who has recently examined the specimen, also informs me that there are nine spines in the dorsal. In a collection of young specimens of *Enneacanthus margarotis* from Virginia, which I have examined in the National Museum, there were several specimens with the fin formula D. 9, A. 4, several with the formula D. 10, A. 4, and the remainder with the formula D. 9, A. 3. That is, some of these specimens, all collected at the same time, and evidently of the same species, were *Enneacanthus margarotis*, others were *Hemioplites simulans*, and the remainder would represent a second species of *Copelandia.*

In 120 specimens of *Enneacanthus margarotis* examined by me, the results were as follows:

13 specimens with D. 8, A. 3.
89 specimens with D. 9, A. 3.
9 specimens with D. 10, A. 3.
5 specimens with D. 10, A. 4.
4 specimens with D. 9, A. 4.

In the examination of 53 specimens of *Enneacanthus obesus* the following results were obtained:

4 specimens with D. 8, A. 3.
46 specimens with D. 9, A. 3.
2 specimens with D. 10, A. 3.
1 specimen with D. 10, A. 4.

In view of these facts, I include *Hemioplites* and *Copelandia* under *Enneacanthus.*

32. **Enneacanthus simulans** (Cope) McKay = *Enneacanthus margarotis* Gill & Jor.; *Hemioplites simulans* Cope; *Enneacanthus pinniger* Gill & Jor.

Having examined the types of *Enneacanthus pinniger*, and compared them with large-finned males of *Enneacanthus margarotis*, I am unable to find specific differences. They are probably specimens which have developed under more favorable circumstances than are usually accorded to the species.

33. **Enneacanthus obesus** (Grd.) Gill.
34. **Enneacanthus gloriosus*** (Holbr.) Jor.
35. **Enneacanthus eriarchus** (Jor.) McKay,

### 10. Genus MICROPTERUS Lacépède.

36. **Micropterus salmoides** (Lac.) Henshall in "Book of the Black Bass" (advance sheets) = *Micropterus pallidus* Gill & Jor.
37. **Micropterus** *dolomieu* Lacépède = *Micropterus salmoides* Gill.

INDIANA UNIVERSITY,
*Bloomington, Ind., March* 10, 1881.

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## A REVIEW OF THE GENUS CENTURUS, SWAINSON.

### By ROBERT RIDGWAY.

### INTRODUCTION.

The collection of the United States National Museum contains examples of all the known species of the genus *Centurus*, excepting *C. hypopolius* (Wagl.), *C. rubriventris* Swains., and *C. terricolor* Berlepsch, the two latter being of some what doubtful status. More or less confusion has hitherto existed regarding the nomenclature of several of the Middle American forms, and it was the desire to clear away as much of this confusion as possible that prompted the investigations upon which this review is based, and which have led to the discovery of relationships which were before quite unsuspected, at least by the writer.

Of the fourteen forms treated of in this paper as sufficiently distinct for definition, not more than six, or less than one-half, can be said to be perfectly isolated, or to possess the requirements of perfectly distinct species; at least the abundant material which has been examined in this connection proves beyond question the intergradation of four so-called species, while it suggests more or less strongly the probability or possibility of such relationship with regard to five of the remaining ten. Those which appear to be unquestionably distinct are the three West Indian species, *C. radiolatus* (Wagl.), *C. superciliaris* (Temm.), and *C. striatus* (Müll.), and three continental species, *C. uropygialis*, Baird, *C. hypopolius* (Wagl.), and *C. elegans* (Swains.). Those which certainly intergrade, and are therefore to be united under one specific designation, are *C. aurifrons* (Wagl.), *C. santacruzi* Bp., *C. dubius* (Cabot), and *C. hoffmanni*, Caban., all of which are, however, strongly characterized geographical races or sub-species. The five forms of doubtful relationship are (1) *C. carolinus* (Linn.), which may possibly grade into *C. rubriventris*, but which is *probably* distinct; (2) *C. rubriventris* (Sw.), with which I am not autoptically acquainted, but which appears to be a northern form of *C. tricolor*, or, possibly, a local race of *C. aurifrons dubius;* (3) *C. tricolor* (Wagl.), which in some specimens so closely approaches *C. aurifrons hoffmanni* that it is often difficult to decide to which a given specimen should be referred; and (4) *C. terricolor*, Berlepsch, which is possibly a local race of *C. tricolor.* In the following synopsis, I have subordinated as sub-species only those forms which are known with certainty to intergrade, all of which belong to *C. aurifrons.* Those of doubtful relationship are treated as species, since it seems best to accord them that rank until it can be proven they are not entitled to it. Two more or less apocryphal species referred by Malherbe (*Monographie des Picidées*, ii, 1862) to this genus, *Picus gerini*, Temm. and *P. aurocapillus*, Vig., are not included in the synoptical table, but a transcription of Malherbe's account of these supposed species is given at the end of this paper.

### LITERATURE.

The genus *Centurus* has received special attention, so far as I have been able to discover, from but three authorities, viz, Malherbe, Cabanis, and Sundevall, whose arrangements of the species, with the equivalent names of the present synopsis, are given below in chronological order. Also, as showing the latest arrangement, the names adopted in Sclater and Salvin's *Nomenclator Avium Neotropicalium.*

#### (1.) MALHERBE (1862).

Monographie des Picidées, etc., etc., par Alf. Malherbe. 4 vols. folio. Metz: 1861–2. [The genus "Zebrapicus" (= *Centurus*) is treated in vol. ii (text), pp. 223–250, and vol. iv (plates), pll. —.]

1. *Zebrapicus superciliaris*, p. 223, pl. 102, figs. 1, 2, and 4. = *C. superciliaris.*
2. " *elegans*, p. 225, pl. 102, figs. 5, 6. = *C. elegans.*
3. " *pucherani*, p. 227, pl. 103, figs. 1, 2. (= *Melanerpes pucherani.*)
4. " *hypopolius*, p. 228, pl. 103, figs. 4, 5. = *C. hypopolius.*
5. " *gerinii*, p. 231. (= *Melanerpes pucherani?*)
5. " *striatus*, p. 231, pl. 107, figs. 2, 3. = *C. striatus.*
6. " *carolinus*, p. 234, pl. 103, figs. 7, 8. = *C. carolinus.*
7. " *radiolatus*, p. 237, pl. 104, figs. 5, 6. = *C. radiolatus.*
8. " *aurifrons*, p. 240, pl. 104, figs. 1, 2, 3. = *C. aurifrons.*
9. " *santa-cruzi*, p. 241, pl. 105, figs. 4, 5. = *C. aurifrons santa-cruzi.*
10. " *erythrophthalmus*, p. 243, pl. 105, figs. 1, 2. = *C. aurifrons dubius.*
11. " *kaupii*, p. 245, pl. 106, figs. 4, 5. = *C. uropygialis.*
12. " *tricolor*, p. 247, pl. 106, figs. 1, 2. = *C. tricolor.*
13. " *rubriventris*, p. 248, pl. 107, fig. 1. = *C. rubriventris.*
14. " *aurocapillus*, p. 250. (Unidentified.)

#### (2.) CABANIS (1862).

Ubersicht der im Berliner Museum befindlichen Vögel von Costa Rica. <Jour. für Orn. Heft v, x. Jahrgang, September, 1862, pp. 321–336. [A synopsis of the species of *Centurus*, with synonymy and critical remarks, is given on pp. 322–330.]

1. *C. aurifrons*, p. 323. = *C. aurifrons*, as restricted.
2. *C. carolinus*, p. 324. = *C. carolinus.*
3. *C. albifrons*, p. 324. = *C. aurifrons santacruzi* and *C. aurifrons dubius.*

4. *C. polygrammus*, n. sp. p. 326. = *C. aurifrons santacruzi* (the south Mexican form tending toward *hoffmanni*).
5. *C. Hoffmannii*, n. sp. pp. 322, 327. = C. *aurifrons hoffmanni.*
6. *C. elegans*, p. 327. = *C. elegans.*
7. *C. tricolor*, p. 327. = *C. tricolor* and *C. rubriventris*
8. *C. Pucherani*, p. 328. (= *Melanerpes pucherani.*)
9. *C. hypopolius*, p. 329. = *C. hypopolius.*
10. *C. uropygialis*, p. 330. = *C. uropygialis.*

### (3.) SUNDEVALL (1866).

Conspectus Avium Picinarum, edidit Carolus J. Sundevall, Custos Musei Zool. Stockholmiensis. Stockholmiæ: 1866. 1 vol. 8vo. pp. i-xiv. 1-116. [The species of *Centurus* are referred to the genus *Picus*, under which they are ranged as a "Tribus 15. *Pici albofasciati*," on pages 52-56.]

150. *Picus striatus* Gm. (p. 52). = *C. striatus.*
151. " *radiolatus* Wagl. (p. 52). = *C. radiolatus.*
152. " *albifrons* Swains. (p. 52). = *C. aurifrons dubius.*
153. " *aurifrons* Licht. (p. 53). = *C. aurifrons* (as restricted).
154. " *polygrammus* Cabanis (p. 53). = *C. aurifrons santacruzi.*
155. " *carolinus* L. (p. 53). = *C. carolinus.*
156. " *uropygialis* Baird (p. 54). = *C. uropygialis.*
157. " *hoffmanni* Cabanis (p. 54). = *C. aurifrons hoffmanni.*
158. " *tricolor* Wagl. (p. 54). = *C. tricolor.*
159. " *hypopolius* Wagl. (p. 55). = *C. hypopolius.*
160. " *elegans* Swains. (p. 55). = *C. elegans.*
161. " *superciliaris* Temm. (p. 55). = *C. superciliaris.*
162. " *gerini* Temm. (p. 55). (= *Melanerpes pucherani.*)

### (4.) SCLATER & SALVIN (1873).

Nomenclator Avium Neotropicalium, etc., etc. auctoribus Philippo Lutley Sclater, A. M., Phil. Doct., etc., etc. et Osberto Salvin, A. M., etc. Londoni: Sumptibus Auctorum. 1873.

1. *striatus* (Bodd.) ex ins. Hayti. = *C. striatus.*
2. *radiolatus* (Wagl.) ex ins. Jamaica. = *C. radiolatus.*
3. *albifrons* (Sw.) ex Mex. et Guatemala. = *C. aurifrons santacruzi* and *C. aurifrons dubius.*
4. *aurifrons* (Wagl.) ex Mex. bor. = *C. aurifrons* (as restricted).
5. *tricolor* (Wagl.) ex Columb. Venezuela et Veragua. = *C. tricolor.*
6. *hoffmanni*, Cab. ex Costarica. = *C. aurifrons hoffmanni.*
7. *hypopolius* (Wagl.) ex Mexico. = *C. hypopolius.*
8. *elegans* (Sw.) ex Mexico. = *C. elegans.*
9. *superciliaris* (Temm.) ex ins. Cuba. = *C. superciliaris.*
10. *pucherani* (Malh.) ex Mex. Am. centr. et Æquat. occ. (= *Melanerpes pucherani.*)

## Genus CENTURUS, Swainson.

*Centurus*, SWAINS. Classif. B. ii, 1837, 310 (type, *Picus carolinus*, Linn.).—BAIRD, B. N. Am., 1858, 108.—B. B. & R., Hist. N. Am. B. ii, 1874, 553.—COUES, Key, 1872, 196.

*Zebrapicus*, MALHERBE, Mem. Ac. Metz, 1849, 360; Nouv. Class. Pic., 1850, ——; Mon. Pic. ii, 1862, 223 (type, *Picus carolinus* Linn.).

CH.—Bill about as long as the head, or a little longer, the length from the tip to the nostril about equal to the tarsus, or a little greater; decidedly compressed anteriorly, but depressed at the extreme base; the lateral groove distinct for half the length of the bill; culmen decidedly but gently curved from the base; gonys nearly straight, and about half as long as the culmen. Nostrils broad, elliptical, situated about midway between the culmen and tomium, and only partly concealed by the frontal tufts. Anterior outer toe a little longer than the posterior, the inner anterior toe decidedly shorter, and the inner hind toe only about half its length. Wings long and broad, third to fifth primaries longest, the first equal to the sixth to the ninth. Tail about two-thirds as long as the wing, graduated, the feathers (except the outer) rather abruptly attenuated at ends. Colors, banded with black and white, or yellow, above, with more or less of the pileum scarlet in the male; below plain, the abdomen tinged with red, orange, or yellow in most species.

The so-called genus *Centurus* is scarcely more than an artificial division of *Melanerpes*, distinguished from the typical section of that genus chiefly, if not only, by a different system of coloration, which characterizes most of the species. Even in this respect, however, the intergradation of the two sections is so complete that certain species (notably *Zebrapicus pucherani* of Malherbe) may, with almost equal propriety, be referred to either group. The species referred to has usually been included in *Centurus;* but after careful consideration of the question, I have concluded to place it in *Melanerpes*, as being more closely related to certain species of that group than to any of the species of *Centurus* as here restricted. Its nearest allies are undoubtedly the *Melanerpes chrysauchen* of Salvin, which it resembles very closely, and "*Picus*" (=*Melanerpes*) *flavifrons* of Vieillot, and it may well be placed with them, while if allowed to remain in *Centurus* its position would be that of an isolated or aberrant species.

Following is a list of the forms recognized in this review, with the number of specimens of each which have been examined in connection with the preparation of this paper:

| Species. | U. S. Nat. Mus. | Mus. Salv.-Godm. | Mus. G. N. Lawrence. | Mus. H. W. Henshaw. | Mus. S. Cabot. | Mus. R. Ridgway. | Total of each species. |
|---|---|---|---|---|---|---|---|
| 1. C. carolinus | 41 | | | 7 | | 11 | 59 |
| 2. " tricolor | 7 | 7 | 6 | | | 1 | 21 |
| 3 (?). " rubriventris | | | | | | | 0 |
| 4 (?). " terricolor | | | | | | | 0 |
| 5. " aurifrons | 20 | 2 | 3 | | | | 25 |
| 5. *a* " santacruzi | 17 | 6 | 6 | | | | 29 |
| 5. *b* " hoffmanni | 4 | 2 | 2 | | | | 8 |
| 5. *c* " dubius | 1 | 2 | 4 | | 1 | | 8 |
| 6. " radiolatus | 5 | 2 | 3 | | | | 10 |
| 7. " uropygialis | 27 | | 1 | 4 | | | 32 |
| 8. " hypopolius | | 2 | | | | | 2 |
| 9. " elegans | 10 | 2 | 4 | | | | 16 |
| 10. " superciliaris | 8 | 2 | 3 | | | | 13 |
| 11. " striatus | 2 | 1 | 1 | | | | 4 |
| Total number of specimens examined | | | | | | | 227 |

### SYNOPSIS OF THE SPECIES OF CENTURUS.

A.—No red on the rump.

*a.* Without black about the head.

(*Rump and upper tail-coverts white, immaculate, or only slightly varied with black.*)

1. C. CAROLINUS. ♂: Entire pileum and nape scarlet, paler on the forehead; abdomen tinged with pinkish red; inner webs of middle tail-feathers varied with white. ♀: Similar, but crown ash-gray, the red of the head confined to the forehead, occiput, and nape. Wing, 5.00–5.50; culmen, 1.00–1.20. *Hab.*—Eastern United States.

2. C. TRICOLOR. ♂: Crown, occiput, and nape, deep scarlet, sometimes interrupted across the occiput; forehead dingy yellowish white, abdomen deep scarlet; both webs of middle tail-feathers broadly barred or transversely spotted with white; upper tail-coverts immaculate white, or scantily barred, lower with dusky V-shaped markings. ♀: Pileum light drab, growing whitish anteriorly; otherwise like the ♂. Wing, 4.05–4.55; culmen, 0.75–1.10. *Hab.*—Trinidad and Venezuela to Veragua.

[3.? C. RUBRIVENTRIS. ♂: Similar to *tricolor*, but frontlet, cheeks, and chin bright yellow, separated from the scarlet of the crown by a white frontal band; white bars of back, etc., very much narrower than in *tricolor;* middle tail-feathers without white markings, except toward base of outer webs. Wing, 4.75; culmen, 0.80. *Hab.*—Yucatan.

[4.? C. TERRICOLOR. Similar to *tricolor*, but larger, the bill longer and broader; the lower parts darker olive-brown, the abdomen darker red, and the upper and lower tail-coverts regularly barred with black. *Hab.*—"Orinoco district or Trinidad."]

5. C. AURIFRONS. ♂: Crown deep scarlet; nape scarlet, orange, or yellow, coalesced with the scarlet of the crown or separated from it by an occipital band of grayish or olivaceous; frontlet yellow, orange, or red, separated from the red of the crown by a whitish frontal band; abdomen tinged with yellow, orange, or red; markings of the tail-feathers and coverts exceedingly variable. ♀: Differing in the color of the crown, which is entirely grayish, instead of red. Size exceedingly variable. *Hab.*—Middle America.

α. *aurifrons*. Red crown-patch usually isolated; frontlet and abdomen usually yolk-yellow; breast, etc., pale dingy ash, or dull grayish white; tibiæ and crissum with broad V-shaped marks of black; inner webs of middle tail-feathers usually solid black; white bars of upper parts broad, nearly or quite as wide as the black ones. Wing, 5.20–5.65; culmen, 1.20–1.40. *Hab.*—Table-lands of Mexico, north to Southern Texas.

β. *santacruzi*. Red crown-patch usually confluent with the orange-red of the nape; frontlet and abdomen saffron-orange; breast, etc., olive-drab, or deep smoky gray; tibiæ and crissum thickly barred with blackish on a dingy yellowish ground; inner webs of middle tail-feathers usually marked, more or less, with white; white bars of upper parts much narrower than the black ones. Wing, 5.00–5.75; culmen, .95–1.25. *Hab.*—Southern Mexico, Honduras, and Guatemala.

γ. *dubius*. Crown, occiput, and nape intense scarlet, without any shade of orange; frontlet scarlet, separated from the red of the crown by a band of nearly pure white; abdomen, intense scarlet or almost carmine-red; inner webs of middle tail-feathers usually solid black; white bars of upper parts very much narrower than the black ones; tibiæ and crissum densely barred with blackish. Wing, 4.95–5.40; culmen, 1.00–1.30. *Hab.*—Yucatan.

δ. *hoffmanni*. Red of crown usually isolated, as in *aurifrons;* frontlet, pale dull yellowish; lower parts dark colored, with the abdomen saffron yellow as in *santacruzi;* flanks, etc., coarsely barred, as in *aurifrons*, and white bars of upper parts broad, as in that race; inner webs of middle tail-feathers edged with white and deeply indented with broad spots of the same, the outer webs with a longitudinal stripe of white. Wing, 4.60–4.75; culmen, .90–1.05. *Hab.*—Costa Rica.

(*Rump and upper tail-coverts black, narrowly barred with white.*)

6. C. RADIOLATUS. ♂: Pileum and nape bright scarlet-crimson; remainder of the head, including a frontal band, soiled white (sometimes pure white on the forehead), changing quite abruptly on the jugulum, breast, etc.; abdomen, deeply tinged with saffron-red, upper parts black with narrow thread-like bars of white; crissum, etc., black, narrowly barred with white. ♀: Similar. but crown and occiput smoky gray, lighter anteriorly. Wing, 5.00–5.40; culmen, 1.30–1.45. *Hab.*—Jamaica.

(*Rump and upper tail-coverts white, regularly barred with black.*)

7. C. UROPYGIALIS. Head, neck, and lower parts rather light smoky drab, usually deepest on the nape; paler on the forehead, and tinged with yellow on the abdomen; upper parts, *including rump and upper tail-coverts*, broadly barred with black and white; inner webs of middle tail-feathers white, broadly barred with black. ♂: Crown with a central patch of scarlet-crimson. ♀: Without any red on the crown. Wing, 5.00–5.30; culmen, .95–1.25. *Hab.*—Northwestern Mexico and contiguous portions of Southwestern United States.

*b.* With black markings about the head.

8. C. HYPOPOLIUS. ♂: Head, neck, and lower parts deep smoky gray, or purplish drab, darkest on head above and nape, lightest on forehead, chin, and throat; orbits surrounded by a blue-black circlet, interrupted posteriorly by white on the upper eyelid; centre of crown with a patch of crimson, and lower part of auriculars touched with the same; upper parts broadly barred with glossy black and brownish white; inner webs of middle tail-feathers varied with white. ♀: Similar, but lacking the red of the crown. Wing, 4.90–5.00; culmen, .85–.90. *Hab.*—Table-lands of Southern Mexico.

9. C. ELEGANS. ♂: Crown and occiput rich crimson-scarlet, nape bright orange or yellow; orbits surrounded by black, broader above and behind the eye; rest of head smoky grayish, tinged more or less anteriorly with golden yellow; abdomen tinged with golden yellow; upper parts broadly barred with black and white; both webs of middle tail-feathers broadly barred with white. ♀: Similar, but crown and occiput ash-gray, the latter sometimes suffused with black. Wing, 4.50–4.90; culmen, .95–1.10. *Hab.*—Western Mexico.

10. C. SUPERCILIARIS. ♂: Pileum and nape bright crimson-scarlet, with a large longitudinal patch of black on each side of the crown, extending from the anterior angle of the eye to the occiput; rest of head, including band across forehead, dull whitish, changing gradually to buffy drab on breast, etc.; middle of abdomen bright red; upper parts broadly barred with black and white, the back tinged with buff-yellow; inner webs of middle tail-feathers white, with broad bars of black, the outer webs with a longitudinal stripe of white. ♀: Similar, but whole forehead and anterior part of crown white, the posterior portion of the crown, and the occiput, black, this confluent with the black superciliary patches. Wing, 5.40–6.00; culmen, 1.30–1.65. *Hab.*—Cuba.

B. Rump bright blood-red, or crimson-scarlet.]

11. C. STRIATUS. ♂: Pileum, nape, lower rump, and upper tail-coverts bright scarlet-crimson; lower posterior side of neck with longitudinal stripes of black and dingy white; remainder of head and neck smoky-gray, gradually changing to deep smoke-brown on breast, etc.; abdomen, crissum, etc., light yellowish olive-green, without markings; upper parts (back, etc.), broadly barred with black and bright yellowish olive-green; middle tail-feathers solid black. Wing, 4.30–5.20; culmen, 1.00–1.30. *Hab.*—Hayti and St. Domingo.

## 1. CENTURUS CAROLINUS.

*Épeiche ou Pic rayé de la Louisiane*, Buff. Ois. vii, 73.

*Pic rayé, de la Louisiane*, Buff. Pl. Enl. 692 (♀ ad.)—Vieill. N. D. xxvi, 90.

*Picus ventre rubro*, Catesby, Car. i, 19, pl. 19, f. 2.

*Picus carolinus*, Linn. S. N. ed. 10, i, 1758, 113 (based on Catesby, l. c.); ed. 12, i, 1776, 174.—Wils. Am. Orn. i, 1808, 115, pl. 7, fig. 2.—Nutt. Man. i, 1832, 572.—Aud. Orn. Biog. v, 1839, 169, pl. 415; Synop. 1839, 183; B. Am. iv, 1842, 270, pl. 270. Sundev. Consp. Pic. 1866, 53.

*Centurus carolinensis*, Swains. Classif. B. ii, 1837.

*Centurus carolinus*, Bonap. Comp. List, 1838, 40; Consp. i, 1850, 119.—Baird, B. N. Am. 1858, 109; Cat. N. Am. B. 1859, no. 91.—Dresser, Ibis, 1865, 469 (S. Texas; common resident).—Allen, Pr. Essex Inst. iv, 1864, 53 (Massachusetts; accidental); Bull. M. C. Z. ii, 1871, 306 (Florida); iii, 1872, 180 (Kansas).—Coues, Key, 1872, 196; Check List, 1873, no. 306; B. N.-W. 1874, 289.—Ridgw. Bull. Essex Inst. Nov. 1873, 185 (Colorado); Field & Forest, June. 1877, 209 (Boulder Co. Colorado); Cat. N. A. B. 1880, no. 372; Nom. N. A. B, 1881, no. 372.—B. B. & R. Hist. N. Am. B. ii, 1874, 554, pl. 52, figs. 1, 4.—Nels. Bull. Essex Inst. viii, 1876, 116, 153 (n. e. Illinois: rare sum. res. leaving last of Oct.: comm. in migr.).—Merriam, Trans. Conn. Acad. iv, 1877, 65 (accid. in Connecticut).—Brewst. Bull. Nutt. Orn. Club, ii, Oct. 1877, 108 (do.).—Mearns, ib. July, 1878, 146 (Cornwall, N. Y. Sept. 1870).

*Zebrapicus carolinus*, Malh. Mém. Ac. Metz, 1849, 361; Mon. Pic. ii, 1862, 234; iv, 1862, pl. ciii, figs. 7 (♂ ad.) 8 (♀ ad.).

*Melanerpes* (*Centurus*) *carolinus*, Ridgw. Ann. Lyc. N. Y. Jan. 1874, 378 (Illinois).

*Picus zebar*, Bodd. Tabl. P. E. 1783 (ex Pl. Enl. 602).

*Picus griseus*, Vieill. O. A. S. ii, 1807, pl. 116 (♂ ad.).

*Picus erythrauchen*, Wagl. Syst. Av. 1827, no. 38; Isis, 1829, 513.

*Le Pic Carolin*, Valenc. Dict. Sc. Nat. xi, —, 181.

*Le Pic gris*, Vieill. l. c.

*Pic gris rayé*, Vieill. N. D. xxvi, 77.

*Pic rayé gais*, Vieill. "Dict. pitt. hist. nat. p. 627."

*Red-bellied Woodpecker*, Catesby, Car. i, 1731, 19, et auct.

*Carolina Woodpecker*, Lath. Synop. i, 1781, 570.

*Le Piczèbre de la Caroline*, } Malh. l. c.
*Piczèbre Carolin*, }

*Hab.*—Eastern United States, west to the eastern slope of Rocky Mountains, south to Florida and Texas. Rare in northern States, and apparently wanting in the valley of the Rio Grande. Most numerous in the Mississippi Valley and Gulf States.

*Adult* ♂: Entire pileum and nape bright scarlet, deepest on the crown, the forehead lighter, or more pinkish (sometimes approaching reddish white); rest of the head and neck, with lower parts, pale buff-grayish, lighter on the chin and throat; middle of the abdomen pinkish red, the remainder of the lower parts sometimes tinged with the same, especially on the breast and cheeks; tibiæ and crissum white, relieved by rather sparse hastate marks of black. Back scapulars and upper part of rump broadly and distinctly barred with black and white, the two colors in about equal proportion, or the black bars rather the wider; wings black, the coverts and secondaries barred with pure white; primaries tipped with white, narrowly margined with the same beyond their emarginations, and blotched with white near the base; upper tail-coverts and lower part of rump white, relieved by rather sparse irregularly hastate spots or bars of black, the coverts sometimes nearly immaculate. Tail black; the inner webs of the *intermediæ* chiefly white, crossed with a greater or less number of broad black bars, or transverse spots, the outer webs with a longitudinal stripe of white on the basal half; outer rectrices broadly barred at the ends with dull white, and with spots of the same indenting the outer web; next pair of feathers tipped with yellowish white. *Adult* ♀: Similar to the ♂, but red of the crown replaced by deep ash-gray, lighter anteriorly; lower parts tinged with red only on the abdomen, and cheeks with little if any red tinge. *Young* ♀: Whole pileum dull brownish gray, transversely mottled with darker; nape dull light fulvous-red; back and scapulars barred with grayish white and grayish dusky, much less sharply than in the adult; abdomen tinged with dull buff, but without red. *Adult:* Total length (fresh specimens), 9–10½ inches; extent, 15⅝–17½; wing (skins), 4.85–5.40; tail, 3.50–3.90; culmen, 1.00–1.20; tarsus, .80–.90. Bill (in life), slate-black, the basal portion of gonys sometimes mixed with light ashy; iris varying from ferruginous to bright scarlet; naked orbital spaces olivaceous-ashy; legs and feet olivaceous. In the *young*, iris brown.

Among adult males of this species, the principal variation is in the amount of red tinge on the lower parts. In most examples from the Atlantic States and in many from the Mississippi Valley, the reddish is entirely confined to the middle of the abdomen, while on the head there is a mere tinge of it on the lores and cheeks. Many western specimens, however, have the breast more or less strongly tinged with purplish pink, while two now before me (No. 34317, Kansas City, Mo., May 14, 1864, E. Coues, and one, in my own collection, from Mount Carmel, Ill. May 28, 1878), have not only the lores and cheeks, but the whole chin and upper throat also, bright salmon-color, or saffron-pink. In these highly-colored specimens the forehead is a bright saffron-red, while the Kansas City specimen above alluded to has the red on the abdomen very intense, approaching a saffron-scarlet. Floridan specimens are slightly smaller than northern ones, have the white bars of the dorsal region narrower, but are on the average less richly colored than examples from the Mississippi Valley, only one of five adult males approaching those described above in the depth and extent of the red tinge to the lower parts, throat, etc. The under surface is usually more dingy than in northern examples, while the forehead appears to be lighter red, more abruptly contrasted with the intense crimson-scarlet of the crown. Of six adult females from South Florida, two (Nos. 395, coll. H. W. Henshaw, Cedar Keys, December 6, 1871, and 4924, Amelia Island, G. Würdemann), have the occiput slightly mottled with black. Two examples from Southern Illinois, in my own collection (obtained October 15, 1873, and October 7, 1879), agree in this respect, however, with these Florida examples. They likewise have the black bars of the dorsal region equally wide, but they are decidedly larger birds. A male from Waller County, Texas (No. 70963, Kumlien and Earll), agrees in every respect with Illinois examples. An adult female from Southern Illinois (Mount Carmel, October 18, 1879), has the occiput red, like the nape, while there are several red feathers in the middle of the crown.

## 2. CENTURUS TRICOLOR.

*Picus tricolor*, Wagler, Isis, 1829, 512 (♂ ad.; "Mexico").

*Centurus tricolor*, Licht. Nomencl. 1854, 76.—Scl. Cat. 1862, 343, no. 2049 (Bogota; Venezuela).—Taylor, Ibis, 1864, 93 (Venezuela).—Scl. & Salv. P. Z. S. 1864, 367 (Isth. Panama); Nom. Neotr. 1873, 100 (Venezuela, Colombia, Veragua).—Salvin, P. Z. S. 1867, 157 (Veragua); 1868, 169 (Venezuela).—Wyatt, Ibis, 1871, 381 (Sta. Marta, Colombia).

*Zebrapicus tricolor*, Malh. Mon. Pic. ii, 1862, 247; iv, pl. cvi, figs. 1, 2 (♂ and ♀ ad.).

*Centurus carolinus* var. *tricolor*, B. B. & R. Hist. N. Am. B. ii, 1874, 554.

"*Centurus subelegans*" Reich. Handb. 1851, 411, pl. dclxv, figs. 4415–16 (nec Bonap. 1837).—Scl. P. Z. S. 1855, 162; 1856, 143.

"*Centurus rubriventris*", Lawr. Ann. Lyc. N. Y. vii, 1861, 299 (Panama; nec Swains. 1838).

*Le Piczèbre tricolore*, } Malh. *l. c.*
*Piczèbre tricolor*, }

*Adult* ♂: Forehead dull smoky whitish, more or less tinged with yellow anteriorly (on the frontal feathers); crown, occiput, and nape, bright crimson-scarlet, lighter posteriorly, occasionally interrupted by a band of smoky gray or light drab across the occiput; remainder of head and neck, with lower parts, smoky drab, the head lighter anteriorly; middle of the abdomen bright scarlet; tibiæ and crissum marked with broad V-shaped bars of black. Back and scapulars broadly barred with black and white, the bars of the latter narrower than the black ones; wings black, the coverts and secondaries broadly barred with white; primaries bordered terminally with white, and blotched with the same near the base. Upper tail-coverts and most of the rump white, often immaculate, sometimes irregularly and scantily barred with dusky. Tail black, both webs of the *intermediæ* broadly barred or transversely spotted with white; lateral rectrices hoary smoky drab on the under surface, the terminal portion with several more or less complete whitish bars. *Adult* ♀: Similar to the ♂, but red of the pileum replaced by light drab, growing gradually paler anteriorly. Bill blackish; feet dusky (olivaceous in life?). *Young* ♀: Similar to the adult, but all the markings less sharply defined, and the colors duller. *Young* ♀: More dully colored than the adult, the nape dull orange-fulvous, instead of scarlet, the bars of the back, etc., more indistinct, and tinged with light brownish. Wing, 4.05–4.55; tail, 2.50–2.70; culmen, .75–1.10; tarsus, .75–.80.

In general appearance this species is quite a miniature of *C. carolinus*, but it is probably distinct specifically. Close inspection reveals many points of difference besides the very much smaller size. The frontlet is yellow instead of pinkish red, and the deep red of the crown is very abruptly defined anteriorly against the whitish of the forehead, instead of blending into the color of the frontlet, there being no trace of a whitish frontal band in *C. carolinus;* the abdomen in *C. tricolor* is bright scarlet, instead of light pinkish red. In *C. carolinus* the tibiæ and lower tail-coverts have a few longitudinal, irregularly sagittate marks of dusky, whereas these parts in *tricolor* are heavily banded with transverse, somewhat V-shaped bars. In *carolinus* only the inner webs of the middle tail-feathers are barred or spotted with white, while in *tricolor* both webs are so marked. *C. tricolor* is also very much darker colored underneath than *C. carolinus.* The females of the two species do not resemble one another so closely as do the males. In that of *C. tricolor* the red of the nape is both more restricted and duller than in that of *C. carolinus*, the pileum is of a light smoky drab, instead of pure ash-gray, and the forehead is dull whitish, tinged with yellow anteriorly, instead of pinkish red.

These comparisons apply to the most southern examples of *C. carolinus* I have been able to examine, viz, a considerable number from Texas and South Florida.

In this species, as in most others, there is much individual variation. In a majority of the adult males the red of the nape is continuous with that of the crown, but in some (as in an example from New Granada, in the collection of Salvin and Godman), the occiput is completely crossed by a wide band of light smoky drab, widely separating the orange-red of the nape from the bright crimson vertical patch. Other examples show a more or less complete coalescence of the two red areas, in variable degree, according to the individual. Such examples appear to include adults as well as young birds, so that age has apparently nothing to do with the variation in question. In specimens having the crimson of the crown widely separated from the more flame-colored red of the nape there is a rather close resemblance to some specimens of *C. hoffmanni*, in which, however, the abdomen is yellow instead of bright red, the outer webs of the middle tail-feathers streaked, instead of barred or spotted, and the nape decidedly red, instead of orange-yellow.

### 3 (?). CENTURUS RUBRIVENTRIS.

*Centurus rubriventris*, SWAINS. Ann. in Menag. 1838, 354 (hab. ignot.).—GRAY, Gen. B. ii, 1849, 442.—LAWR. Ann. Lyc. N. Y. ix, 1869, 206 (Yucatan).

*Zebrapicus rubriventris*, MALH. Mon. Pic. ii, 1862, 248; iv, 1862, pl. cvii, fig. 1 (♂ ad.). (Mexico?)

"*Zebrapicus swainsonii*, MALH. 1845, in mus Britan." (MALHERBE.)

"*Picus aurifrons*", BONAP. P. Z. S. 1837, 116 (nec Consp. i, 1850, 119). (*Fide* MALHERBE.)

*Piczèbre à ventre sanguin*, MALH. l. c.

*Hab.*—Yucatan.

This bird, which appears to be a well-defined form, I have not seen, and therefore copy Swainson's original description, and Mr. Lawrence's remarks in Ann. Lyc. N. Y., ix, 1869, pp. 206–7, which, with Malherbe's account, is all that is known regarding it. The specimen in the Smithsonian collection alluded to by Mr. Lawrence has unfortunately been mislaid, so that I am unable to make a direct comparison.

Swainson's description is as follows:—

"Front of the head, cheeks, and chin golden yellow; ears, and connected stripes over the eyes, cinereous white; nape, middle of the crown, and the belly, crimson; rump, pure white.

"Inhabits ———? Mus. Nost.

"This most elegant species is the smallest *Centurus* I have yet seen. Total length, $7\frac{8}{10}$ inches; bill, gape 1; front, $\frac{8}{10}$; wings, $4\frac{3}{10}$, nearly as long as the tail, which from the base is 3; tarsus, $\frac{6}{10}$. Upper plumage, as in the last, banded with black and white; the latter being narrower than the former; the broad grayish-white band over each eye unites in front, and there becomes white, so as to separate the golden yellow round the bill from the crimson of the crown; the yellow covers all the face before the eye, and passes round the chin; the under plumage is light cinereous gray, the middle of the body and belly being tinged with crimson; the tail-feathers are black and unspotted, except the base of the middle pair and a few spots and obsolete bands on the outermost; bill deep black."

With regard to a specimen from Yucatan, supposed to be the same as Swainson's bird, Mr. Lawrence (*l. c.*) writes as follows:—

"A single male specimen agrees closely with Swainson's description; its validity, as a species, has been doubted by many writers, and generally referred to *C. tricolor*, though admitted to be distinct by Malherbe, and accurately figured and described in his splendid Mon. of the *Picidæ*. It seems to be very rare, as Malherbe states that besides Swainson's example he only knows of the male in his own collection. With specimens before me of *C. tricolor* from Bogota, St. Martha and Panama, the distinctness of the two species does not admit of a question. As stated by Malherbe, the bands on the upper plumage of *tricolor* are twice the width of those of *rubriventris;* in the last species the transverse white lines on the back are similar to those of *C. albifrons*, while in *tricolor* they are much as in *C. aurifrons;* another marked difference is in the central tail-feathers; those of *tricolor* are deeply and broadly indented with white on both webs, whereas in the example of *rubriventris* these feathers are black, except for a small space at the base on the outer web, where it is white, this color extending higher up next the shaft. In size and general coloring the two species are much alike.

"The acquisition of this specimen is of much interest, as it helps to set at rest any doubt of its claim as a distinct species, and determines its locality heretofore unknown, though supposed to be some part of Mexico."

## 4 (?). CENTURUS TERRICOLOR.

*Centurus terricolor*, BERLEPSCH, Ibis, Jan. 1880, 113 ("Orinoco district or Trinidad").

"Affinis *C. tricolori* (ex Bogotâ), sed major, et rostro longiore, latiore; capitis lateribus, gulâ et abdomine toto obscurè brunneo-olivaceis; ventre medio obscurè rubro (nec flavo-rubro); tectricibus caudæ superioribus inferioribusque nigro regulariter fasciatis, primo viso distinguendus. Long. alæ 108, caudæ 60, rostri 24, tarsi 19."

Judging from the above description, this bird closely resembles *C. tricolor*, but is much darker colored, and with the upper tail-coverts much more distinctly and regularly barred than in that form. It is possibly a local race of *C. tricolor*.

## 5. CENTURUS AURIFRONS.

*Picus aurifrons*, WAGL. Isis, 1829, 129, 512 (♂ ad.; Mexico).—LICHT. Nomencl. 1854, 76.—SUNDEV. Consp. Pic. 1866, 53.

*Centurus aurifrons*, GRAY, Gen. B. ii, 1849, 442.—BONAP. Consp. i, 1850, 119.—CABAN. J. f. O. 1862, 323.—COOPER Orn. Cal. i, 1870, 399 (Texas).—COUES, Key, 1872, 196, Check List, 1873, no. 307.—B. B. & R., Hist. N. Am. B. ii, 1874, 577, pl. lii, figs. 3 and 6.—SENNETT, Bull. U. S. Geol. & Geogr. Surv. Terr. iv, no. 1, 1878, 39 (Hidalgo and Brownsville, Texas; abt.).—MERRILL, Pr. U. S. Nat. Mus. i, 1878, 151 (Ft. Brown, Texas, abt.).—RIDGW. Cat. N. Am. B. 1880, no. 373: Nom. N. A. B. 1881, no. 373.

*Zebrapicus aurifrons*, MALH. Mon. Pic. ii, 1862, 240; iv, pl. 104, figs. 1–3 (♂ and ♀ ad., ♂ juv.).

*Centurus subelegans*, BONAP. P. Z. S. Nov. 14, 1837, 109 (♂ ad.; Mexico); Consp. i, 1850, 119; Notes Delatr. 1854, 85; Consp. Zygod. 1854, no. 220 (excl. syn.).

*Centurus flaviventris*, SWAINS. An. in Menag. 1838, 354 (hab. ignot.; ♂ ad.).—SCL. P. Z. S. 1857, 8.—BAIRD, B. N. Am. 1858, 110; ed. 1860, pl. 42; Cat. N. Am. B. 1859, no. 92; Mex. Bound. Surv. ii, 1859, 5, pl. 4.—HEERMAN, Pacific R. R. Rep. X. c. 1859, 18.—DRESSER, Ibis, 1865, 469 (R. Grande, n. e. to Guadalupe R.; resid.).

*Picus ornatus*, LESS. Mag. Zool. 1839, 102 (♂ ad.).—WEIGM. Arch. für Naturg. 1841, 99.

*Centurus ornatus*, REICH. Handb. 1854, 410, pl. 664, figs. 4409–'10.

"*Centurus elegans*", LAWR. (nec SWAINS.) Ann. Lyc. N. Y. v. Apr. 28, 1851, 116 (Texas).

"*Centurus Santa-Cruzi*," LAWR. (nec BONAP.) Ann. Lyc. N. Y. v, 1851, 123 (W. Texas).

*Yellow-bellied Woodpecker*, BAIRD, l. c. et AUCT.

*Golden-fronted Woodpecker*, COUES, l. c.

*Le Piczèbre á front d'or* } MALH. ll. c.
*Pic-Zèbre à Front d'or* }

*Hab.*—Table-lands of Mexico, north to the Guadalupe River in Southern Texas.

*Adult* ♂: Frontlet yolk-yellow; nape, bright orange-yellow, varying to orange-red in some specimens; occiput (usually) and sides of the crown ash-gray; middle of the crown covered by a patch (usually isolated) of bright crimson-scarlet; rest of the head, including a band across the forehead, dingy ashy white, or pale dingy ash, as are also the lower parts back to the flanks and abdomen; middle of the abdomen more or less deeply tinged with yolk-yellow; tibiæ and crissum grayish white, marked with irregular broad V-shaped bars of black. Back, scapulars, wing-coverts, and upper part of rump barred, in about equal proportions, with black and white, the former predominating on the wings; secondaries black, broadly barred with white; primaries black, tipped with white, and with a somewhat broken but conspicuous patch of the same near the base, on the outer surface; upper tail-coverts and lower part of rump white, usually nearly or quite immaculate. Tail black, the inner webs of the *intermediæ* usually wholly black, but very rarely (in only one among twenty-five specimens) with a slight blotching of white toward the base, and partially concealed by the coverts; outer rectrices inclining to hoary drab on the under surface, the outer webs notched with white toward the end, and the terminal portion of the inner web with one or two bars of white; next feather sometimes tipped with brownish white or light brown. *Adult* ♀: Similar to the male, but red crown-patch wanting, the whole pileum being ash-gray, lighter anteriorly. Young ♂ (not full grown): Colors much more dingy than in the adult, and all the markings less clearly defined. Pileum dull light grayish brown, the feathers somewhat mottled with dusky, passing gradually into light yellowish fulvous on the nape, the middle of the crown dull red; back washed with fulvous; breast streaked with black. (No. 45044, Laredo, Tex., July 28, 1866; H. B. Butcher.) Bill slate-black; feet dusky (olivaceous in life?). Wing, 5.20–5.65; tail, 3.40–3.75; culmen, 1 20–1.40; tarsus, 1.00.

Decidedly the largest specimen among the twenty-five before me is an adult male from Silao, Mexico (Mme. Verdey), in the collection of Messrs. Salvin and Godman. In this the red crown-patch is very large, covering the entire vertex, and anteriorly touching the orange-yellow frontlet, thus almost obliterating the usual grayish white frontal band; the nape is a deep reddish orange, more yellow below. No. 46815, from Laredo, Texas (January 16, 1867; H. B. Butcher), also has the red crown-patch very large, and the nape still more intense flame-color than the preceding; the white frontal band is well defined and complete, however, though posteriorly the red crown very nearly joins the orange-red of the nape along the middle line. No. 74677, Medina County, Texas, (April 19, 1878; G. H. Ragsdale), has the whitish frontal band broader, and the red crown much more restricted, though posteriorly it apparently does join the bright orange nape in the middle portion. In most examples, however, the red on the crown forms a thoroughly isolated patch of variable form (oval, shield-shaped, or squarish, according to the "make" of the skin), the nape bright orange-yellow, and the frontal band, of grayish white, broad and complete. In the female the yellow of the nape is usually much less intense than in the male, in one example belonging to Messrs. Salvin and Godman's collection (vicinity of Mexico City, Boucard) being of a dull oily-yellow hue.

An adult male from Texas, in Mr. Lawrence's collection, has the red of the crown completely confluent with that of the nape, exactly as in typical *santacruzi*, except that the gray of the superciliary region encroaches a very little on the sides of the occiput; the deep golden yellow of the forehead is unusually extended posteriorly, leaving only a narrow bar of white between it and the red; the nape is decidedly more flame-colored than the crown, and changes quite abruptly below and along each side into olivaceous golden yellow. The lower parts are as light as in the most extreme examples of *aurifrons*, while the flanks and crissum are entirely destitute of bars, having, instead, longitudinal sagittate marks of black. The inner webs of the *intermediæ* are solid black.

### 5*a*. CENTURUS AURIFRONS SANTA-CRUZI.

*Centurus Santa Cruzi*, Bonap. P. Z. S. Nov. 14, 1837, 116 (♂ ad.; Mexico); Consp. i, 1850, 119; Consp. Zygod. 1854, no. 221.—Scl. P. Z. S. 1856, 343; 1858, 359; 1859, 367 (Jalapa); 1860, 286, 297; 1864, 177 (city of Mexico); Catal. 1862, 343, no. 248 (S. Mexico; Salama, Guatemala).—Scl. & Salv. Ibis, 1859, 136 (Guatemala).—Owen, Ibis, 1861, 67 (San Geronimo, Guat.; descr. eggs).

*Zebrapicus santa-cruzi*, Malh. Mon. Picid. ii, 1862, 241; iv. pl. cv, figs. 4 (♂ ad.) 5 (♀ ad.).

*Picus Grateloupensis*, Less. Mag. Zool. 1839, 41 (♂ ad.; Mexico).

*Centurus grateloupensis*, Bonap. Consp. Zygod. 1854, no. 223 (excl. syn.).

"*Picus subelegans*", Less. Descr. d'Ois. réc. déc. 1847, 206 (nec Bonap. 1837).

*Picus chrysogenys*, Vig. Zool. Beechey's voy. 1840, 24.—Weigm. Archiv. 1841, 99.

"*Centurus aurifrons*", Lawr. Bull. U. S. Nat. Mus. no. 4, 1876, 35 (Chihuitan, Juchitan, and Sta. Efigenia, Isth. Tehuantepec; Nov., Jan.).

"*Centurus albifrons*", Caban. J. f. O. 1862, 324.—Scl. & Salv. P. Z. S. 1869, 364; Nom. Neot. 1873, 100. (Probably not *Picus albifrons*, Swains., which apparently = *C. radiolatus*.)

*Centurus polygrammus*, Caban. J. f. O. Sept. 1862, 326 (St. Bartolo, S. Mexico).

*Le Pic de Grateloup*, Less. Rev. Zool. 1839, 41.

*Le Pic subelégant*, Less. Descr. d'Ois. réc. déc. 1837, 206.

*Le Piczèbre de Santa-Cruz*, Malh. *l. c.*

*Hab.*—Southern Mexico, Honduras, and Guatemala.

*Adult* ♂: Frontlet yellowish, varying from pale yolk-yellow to bright orange, with a red tinge centrally; entire crown and nape bright red, darker (deep scarlet-crimson) anteriorly, lighter and brighter on the nape, the lower part of which is more or less tinged with orange; the occiput sometimes ash-gray laterally, thus partly separating the deep red of the crown from the more orange hue of the nape; forehead and anterior part of superciliary region ashy white, forming a distinct and sharply-defined band across the former; remainder of the head light dingy ash (sometimes tinged with dingy yellow anteriorly), deepening gradually into olive-drab on the jugulum, breast, and sides; abdomen rather dull orange-yellow, in some specimens inclining to orange-red; tibiæ, anal region, and crissum pale fulvous, or dingy yellowish white, thickly barred with blackish, the bars inclining to V-shape, especially ton the crissum. Back, scapulars, wings, andail black, narrowly barred, except on the primaries and tail, with white; upper tail-coverts and rump immaculate pure white, the shafts of the former brownish or dusky; primaries narrowly skirted with white beyond their emarginations, more broadly tipped with the same, and (usually) with more or less of white spotting near the base on the outer webs; inner webs of middle pair of tail-feathers usually more or less marked with white (very rarely solid black); outer rectrices hoary drab on the under surface, the outer edge indented with small white spots, or indications of bars, the end portion of the inner webs usually with one or more white bars (sometimes with none). *Adult* ♀: Similar to the ♂, but entire pileum light ash-gray, becoming lighter anteriorly; nape varying from bright saffron-yellow to scarlet, with scarcely a tinge of orange. *Young* ♂: Similar to the adult, but all the markings much less distinct, and the colors duller. Bill black; iris bright red; feet olive-greenish. (MS. notes on labels.) Wing, 5.00–5.75; tail, 3.10–4.00; culmen, .95–1.25; tarsus, .90–1.00.

Whether the present form is to be regarded as a distinct species or not, there can be no question that it grades directly into three other forms, viz, *C. aurifrons*, *C. dubius*, and *C. hoffmanni*. In its typical condition, however, it is a very strongly characterized race. Among the large series of specimens now before me, many striking variations from the normal type are observable; some of them tending to one or the other of the above-named races, others quite unique in their characteristic features. In most of the adult males, the red of the nape is entirely continuous with that of the crown; but in some (as in No. 57834, Sta. Efigenia, Isth. Tehuantepec, Jan. 10, 1869, F. Sumichrast, and 27955, Mirador, C. Sartorius), the occiput is crossed by a band of ash-gray, almost completely separating the two bright-colored areas. In the former of the above specimens, the head is colored throughout exactly as in some examples of pure *C. aurifrons*, the nape being bright orange, markedly different from the deep red of the crown, and barely connected with it along the median line; but the lower parts are of a deep olivaceous drab, the abdomen deep saffron, and the posterior parts densely barred, as in typical *santacruzi*. The upper parts are more broadly banded with white than in true *santacruzi*, but less widely than in either *aurifrons* or *hoffmanni*. A near approach to the latter form is seen in the broad and distinct white bars (about 7 in number) on the inner webs of the middle rectrices, the outer webs of which are marked with a long narrow white stripe; but the size is much greater, the dimensions fully equalling the maximum of *aurifrons* (wing 5.60, tail 4.10, culmen 1.25). The Mirador specimen is evidently a young bird, and has the inner webs of the middle rectrices chiefly occupied by a large longitudinal blotch of white. Another adult male from the Isthmus of Tehuantepec (No. 57836, Chihuitan, Nov. 20, 1868, F. Sumichrast) is in all respects like the one described, except that the nape is deep orange-red, and this color more completely coalesced with the crimson of the crown. It is also equally large (wing 5.70 tail, 4.00, culmen 1.12). *C. polygrammus*, of Cabanis, appears to have been based upon specimens representing this style. Adult females from the Isthmus of Tehuantepec agree with the males in the broadness of the white bars of the dorsal surface, and the white markings of the middle rectrices; one of them (No. 57835) has the nape bright golden yellow, the other (No. 54197, Juchitan, Sept. 8, 1868) saffron-orange. Both have the outer webs of the primaries largely blotched with white toward the base. As to the females, there appears to be no correlation between the color of the nape and the locality; those with deep red napes coming, respectively, from Baoul, Coban, and Dueñas, Guatemala, and the city of Mexico, those with orange napes from Eastern Mexico (Jalapa and Mirador), Guatemala (Retaluleu), and Western Mexico. Two examples from Honduras, in the collection of Messrs. Salvin and Godman, are remarkable chiefly for their small size. The male (San Pedro, G. M. Whitely) is very intensely colored, the white bars of the dorsal region narrower than in any skins from Guatemala or Mexico, and very strongly tinged with fulvous, the lateral and lower portions of the head deep olive-drab, in marked contrast with the white frontal crescent, the white of the rump stained with fulvous-yellow, and the lower parts much deeper olivaceous than other specimens; the inner webs of the middle rectrices are solid black. The measurements of this specimen are as follows: Wing, 5.00; tail, 3.30; culmen, 1.15; and tarsus, .88. The female (Julian, G. M. Whitely) is of abnormally small dimensions, measuring, wing, 4.60; tail, 2.90; culmen, .95; tarsus, .80. It appears, however, to be an immature bird, and may not have attained its full size. In colors, it is very dark, like the male from San Pedro.

It is not uncommon for very highly-colored examples to have the white of the rump and upper tail-coverts more or less tinged with yellow.

## 5*b*. CENTURUS AURIFRONS DUBIUS.

"*Picus carolinus*", CABOT (nec LINN.), App. Stephens' Trav. ii., —, 475. (Uxmal, *Yucatan.*)
*Picus dubius*, CABOT, Jour. Bost. Soc. N. H. v, 1845, 91. (Uxmal, Yucatan.)
*Picus erythrophthalmus*, LICHT. "Cat. MSS. Mus. Berol. 1844"; Nomencl. 1854, 76.—REICH. Handb. Oct. 1854, 409, tab. 664, figs, 4396–'7 (♂, ♀ ad.).
"*Zebrapicus erythrophthalmus* (Licht.)" MALH. Mon. Picid. ii, 1862, 243; iv, pl. cv, figs. 1–3.
"*Centurus albifrons* (Sw.)", LAWR. Ann. Lyc. N. Y. ix, 1869, 205. (Yucatan.)
"*Picus capistratus*, LICHT. Mus. Berol. 1841, nec NATTER." (MALHERBE.)
*Piczèbre aux yeux rouges*, MALH. l. c.

*Adult* ♂: Entire pileum and nape bright crimson-scarlet (much as in *C. carolinus*), without a trace of orange tinge; frontlet scarlet, separated from the deeper red of the crown by a narrow band of dull, smoky white, or grayish white (sometimes nearly pure white), across the forehead; rest of head and neck light ashy drab, approaching smoky grayish white, deepening on the jugulum, breast, sides, flanks, and upper part of abdomen into light olive-drab, or smoky gray; middle of abdomen bright scarlet, usually without trace of orange tinge; tibiæ, anal region, and crissum, grayish white, thickly marked with V-shaped bars of black. Back, scapulars, wing-coverts, and upper part of rump black, with sharply-defined narrow bars of white, much narrower than the black bars (averaging about half as wide); secondaries narrowly barred with white; primaries black, margined terminally with white, and with a few irregular spots of the same near base of outer webs; upper tail-coverts and rump immaculate pure white. Tail deep black, the under surface hoary drab, and the lateral pair of feathers sometimes showing indications of narrow white bars near the end. *Adult* ♀: Similar, but the whole crown light drab-gray, becoming lighter anteriorly (nearly white on the forehead). Bill slate-black; feet dusky (olivaceous in life?). Wing, 4.95–5.40; tail, 3.40–3.80; culmen, 1.00–1.30; tarsus, .90–.95.

This form is evidently most closely related to *C. santacruzi*, but it may be immediately distinguished, in its typical condition, by the entire absence of even the slightest trace of orange in the red of the nape, while the frontlet and abdomen are a pure deep scarlet, instead of orange-yellow. In other respects, however, there is a very close correspondence in all the colors and markings, even to a minute degree, almost the only difference consisting in the white bars of the dorsal surface being still narrower. In the red abdomen, and pure red pileum, nape, and frontlet, there is a closer resemblance to *C. carolinus* than to *C. santacruzi*, but the red of all the parts named is more intense, while the forehead is invariably crossed by a sharply-defined band of nearly pure white. In other respects the two are very different, *C. carolinus* having the white bars on the back, etc., about three times as wide, the upper tail-coverts varied with black, the middle tail-feathers largely varied with white, etc. Comparing the females of the two species, the present one has the crown an altogether lighter gray, and the red of the nape and frontlet much more intense—the latter also more abruptly defined.

It is not to be supposed, however, that the characters of this form, as given above, are absolutely constant, for this is not the case; on the contrary, specimens now before me plainly indicate, if they do not actually prove, intergradation with *C. santacruzi*. Specimens from northern Yucatan are, so far as I have seen, purely typical; but an adult male in Mr. Lawrence's collection, *said* to be from Guatemala, has the red of the belly decidedly lighter and more flame-colored than in Yucatan examples, while an adult female from Orizaba agrees with it in this respect. The former, moreover, has the inner webs of the middle pair of rectrices deeply notched with white, while the latter has a considerable quantity of white blotching on the inner webs of the same feathers, the outer webs of which are marked, on their basal half, with a conspicuous longitudinal stripe of white, mostly concealed, however, by the upper coverts. In this example, the white bars above are broader (about as in average specimens of *santacruzi*), while the dark bars of the flanks and crissum, as well as the white ones of the terminal portion of lateral rectrices, are much broader than usual.

The type of *Picus dubius*, Cabot, which has been kindly loaned me by its describer, is a fully adult male agreeing in all respects with other specimens from northern Yucatan.

## 5c. CENTURUS AURIFRONS HOFFMANNI.

*Centurus hoffmannii*, CABAN. J. f. O. x, 1862, 322 (Costa Rica).—LAWR. Ann. Lyc. N. Y. ix 1868, 131 (San José and Grecia, Costa Rica).—SCL. & SALV. Nom. Neotr. 1873, 100 (Costa Rica).

*Picus hoffmanni*, SUNDEV. Consp. Pic. 1866, 54.

*Centurus aurifrons* var. *hoffmanni*, B. B. & R. Hist. N. Am. B. ii, 1874, 554.

*Hab.*—Costa Rica.

*Adult* ♂: Frontlet, pale dull yellow; forehead and anterior part of superciliary region, dull whitish; crown crimson-scarlet; nape saffron-yellow, varying to orange, sometimes tinged with orange-red; remainder of the head deep smoky gray (lighter anteriorly and underneath), the lower parts similar, but darker; abdomen deep saffron-yellow; tibiæ, anal region, and crissum heavily barred with black, the bars on the latter more V-shaped. Back, scapulars, and wing-coverts broadly barred with black and white, the two colors in about equal proportion on the dorsal region, the black in excess on the wings, the white bars on the secondaries being only about half as wide as the interspaces; primaries black, the outer webs tipped with white and usually spotted with the same near the base; upper tail-coverts and lower rump immaculate white, usually faintly tinged with yellow; tail black, the inner webs of the *intermediæ* edged with white and deeply indented with broad bars of the same, the outer webs with a narrow longitudinal stripe of white; lateral rectrices hoary drab on the under surface, margined terminally with dull white, the outer web notched along the edge, near the end, with the same, and the terminal portion of the inner web sometimes with one or more indications of white bars. *Adult* ♀: Similar to the ♂, but crown without any red, and yellow of the nape duller and (usually at least) without orange tinge. Bill black; iris hazel (MS. note on label of ♀ ad.); feet dusky (olivaceous in life?). Wing, 4.60–4.75; tail, 2.40–2.90; culmen, .90–1.05; tarsus, .75–.80.

This form presents a curious combination of the features of *C. aurifrons* and *C. santacruzi* with characteristics which are its own. The plumage of the upper parts is exactly that of the former, except that the occiput and sides of the crown are of a decidedly more smoky hue, while the inner webs of the middle tail-feathers are invariably largely marked with white, as described above. The plumage of the lower parts, however, is even darker than in *santacruzi*, though the posterior portions are more coarsely barred, as in *aurifrons*. The peculiar features consist in the small size, and constancy of the white markings on the middle tail-feathers, which is only an occasional feature in *santacruzi* and apparently never occurs in true *aurifrons*.

## 6. CENTURUS RADIOLATUS.

*Picus varius medius jamaicensis*, RAY, Syn. av. 18½, no. 11.
*Picus jamaicensis*, EDW. Gleanings, pl. 244 (♂ ad.).
*Pic varié Femelle, de la Jamaique*, BUFF. Pl. Enl. 597 (♂ ad.).
*Picus carolinus*, part, LINN. S. N. i ed. 12, 1766, 175 (quotes, "*Picus varius medius*, Sloan jam. 2, p. 299, t. 255. *Picus varius jamaicensis*, Briss. av. 4, p. 59. *Picus jamaicensis*, Edw. av. 5, p. 71, t. 244."—Not of ed. 10, 1758, 113, which is based entirely on Catesby).
*Picus radiolatus*, WAGLER, Syst. Av. 1827, *Picus*, no. 39 (♂ ad.; Jamaica); Isis, 1829, 572.
*Centurus radiolatus*, BONAP. Consp. i, 1850, 118; Consp. Zygod. 1854, no. 215.—GOSSE, B. Jam. 1847, 271.—REICH. Handb. 1854, 409, no. 961, pl. dclxiii, fig. 4406 (♂ ad.).—SCL. P. Z. S. 1861, 79; Catal. 1862, 343, no. 2046.—MARCH, Proc. Philad. Acad. 1863, 284.—SCL. & SALV. Nom. Neotr. 1873, 100 (Jamaica).
*Zebrapicus radiolatus*, MALH. Mon. Pic. ii, 1862, 237; iv, pl. civ, figs. 5 (♂ ad.) 6 (♀ ad.)
? *Picus albifrons*, SWAINS. Philos. Mag. i, 1827, 439 (♂ ad.; "Table-lands of Mexico"—error*).—WAGL. Isis, 1829, 514.—LESS. Compl. Buff. ix, 1837, 318.
*Picus larvatus*, TEMM. Pl. Col. livr. 73°, 1838, in text, sub *P. superciliaris*.
*Le Pizèbre de la Jamaique*, MALH. l. c.
*The Woodpecker of Jamaica*, EDWARDS, l. c.
*Radiolated Woodpecker*, GOSSE, l. c.
*Le front blanc*, LESS. l. c.

*Hab.*—Jamaica only.

*Adult* ♂: Pileum and nape bright scarlet-crimson, darkest on the crown; remainder of the head, including forehead, lores, and superciliary stripe, soiled white, changing quite abruptly to smoky drab next to the red of occiput and nape, and on the jugulum, the breast, sides, and abdomen uniform deep olivaceous (slaty plumbeous beneath the surface), and with a deep golden-ochraceous wash in some examples; middle of the abdomen deeply tinged with saffron-red, the tibiæ tinged with the same, and indistinctly barred with grayish dusky and dull whitish; crissum black, narrowly and rather distantly barred with dingy white. Upper parts black, relieved by very narrow thread-like bars of white, these widest apart on wings; upper tail-coverts and lower part of rump also black, crossed by broader and more distinct bars of white; tail deep black, the inner webs of middle pair of feathers (sometimes outer webs also) marked with narrow white bars. *Adnlt* ♀: Similar, but crown and upper part of occiput smoky gray, and the white of the anterior portion of the head more obscured, or dingy. Bill black; feet dusky. *Young* ♀: Similar to the adult, but with red feathers on the middle of the crown. Wing, 5.00–5.40; tail, 3.70–4.30; culmen, 1.30–1.45.

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* "Above blackish, transversely marked with white lines, beneath olivaceous; front, chin, and sides of the head white; crown and neck red.

"Table land; rare.

"Total length, 10½; bill, 1$\frac{6}{10}$; wings, 5; tail, 4."

This bird has usually been referred to one or another of the forms of *C. aurifrons*. Judging from the above description, however, and especially by Bonaparte's comments in P. Z. S. 1837, p. 116, it seems more probable that the present species was the one Swainson had in view, there being at least one other West Indian bird in the same collection erroneously ascribed a Mexican habitat (*Tyrannula barbirostris*, also from Jamaica).

The only species bearing any resemblance to the present one is *C. santacruzi*, which, however, besides being very much smaller, has the upper tail-coverts and lower rump immaculate white, the frontlet golden-yellow or orange, the lower parts much paler, and the white bars of the upper surface much broader. With the exception of *C. superciliaris* (of Cuba), it is the largest member of the genus, and in the decided predominance of black on the rump and lower tail-coverts is entirely peculiar.

### 7. CENTURUS UROPYGIALIS.

*Centurus uropygialis*, BAIRD, Proc. Philad. Acad. vii, June, 1854, 120 (Bill Williams' River, Arizona); B. N. Am. 1858, 111; ed. 1860, pl. 36; Cat. N. Am. B. 1859, no. 93.—REICH. Handb. 1854, 310.—CABAN., J. f. O. 1862, 330 (northern Mexico).—KENNERLY, Pacific R. R. Rep. x, b. 1859, pl. 36.—HEERM. ib. x, c. 1859, 17.—SUNDEVALL, Consp. Pic. 1866, 54.—COUES, Proc. Philad. Acad. 1866, 57 (S. Arizona); Key, 1872, 196; Check List, 1873, no. 308.—COOPER, Orn. Cal. i, 1870, 399 (Ft. Mojave).—B. B. & R. Hist. N. Am. B. ii, 1874, 558, pl. lii, figs. 2 and 3.—RIDGW. Cat. N. Am. B. 1880, no. 374; Nomencl. N. Am. B. 1881, no. 374.

*Centurus sulfureiventer*, REICH. Handb. Oct. 1854, 410, pl. dclxiv, figs. 4411–12 (♂ & ♀ ad.).

*Zebrapicus kaupii*, MALH. Mon. Pic. ii, 1862, 245; iv, 1862, pl. cvi, figs. 4, 5 (♂ and ♀ ad.).*

"*Centurus hypopolius*", PUCH. Rev. et Mag. Zool. 1853, 163 (nec LICHT., ex WAGL.).

*Le Piczèbre de Kaup*, MALH. l. c.

*Gila Woodpecker*, BAIRD, l. c.

*Hab.*—Western Mexico, extending into Arizona (as far as the Gila Valley), southeastern California, and western New Mexico; Lower California.

*Adult* ♂: Head, neck, and lower parts soft, rather light smoky drab, usually deepest on the nape and paler on the forehead; middle of the abdomen pale yolk-yellow, in some specimens inclining to buff; a patch of scarlet-crimson on the middle of the crown; tibiæ and crissum white, broadly barred with black. Back and scapulars broadly and regularly barred with black and white, in about equal proportion; wings black, the coverts and secondaries broadly and sharply barred with pure white; primaries tipped with white, largely blotched with the same near the base, the longer quills narrowly edged with white beyond their emarginations; rump and upper tail-coverts white, regularly barred with black; tail black, the inner webs of the *intermediæ* white, broadly barred with black, the outer webs with a stripe of white extending the greater length of the feathers; outer pair of rectrices broadly barred with white for at least the terminal half (sometimes the whole length), and next pair with several broad bars across the terminal portion. *Adult* ♀: Similar to the ♂, but without the red crown patch. Wing, 5.00–5.30; tail, 3.50–3.90; culmen, .95–1.25; tarsus, .90–.95.

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* Malherbe claims (Mon. Pic. ii, p. 245, foot-note) 1853 as the date of his specific name "*kaupii*", on the ground that Bonaparte instituted the name "en effet" by dedicating it, in the *Revue et Magazin de Zoologie* for that year, to "au savant directeur de Musée de Darmstadt". Inasmuch, however, as not even Dr. Kaup's name was given in the passage quoted as evidence, it will readily appear that Professor Baird's specific term *uropygialis* was really the first proposed.

This is the only species of the genus in which the female has neither red nor yellow anywhere about the head or neck, and in which the lateral tail-feathers are banded for the greater part of their length, and the upper tail-coverts transversely barred.

Among thirteen adult males now before me I find considerable variation, which, however, affects chiefly the color of the nape, the exact shade of color pervading the head and lower parts, and the size and shape of the red crown-spot. In two specimens (76735, Fort Yuma, Dr. A. L. Heermann, and 49689, Camp Grant, Arizona, March 20, 1867, Dr. E. Palmer), the nape inclines very strongly to a light fulvous-buff, strikingly different in color from the occiput, sides of the crown, etc. Usually the nape is similar in tint to the breast, but of a decidedly darker shade, this being particularly the rule in fall specimens, in which the colors are darker and the texture of the feathers softer than in spring and summer. The exact tint varies greatly, however, the darkest example (No. 67153, Pueblo Viejo, New Mexico, September 19, 1873, C. J. Newberry), having the nape a deep sepia-drab, while in the lightest (No. 6129, Camp Yuma, California, A. Schott), it is a light ochraceous-buff, the lower parts being also much paler than usual. Summer specimens, having the plumage more worn and bleached than those killed in the fall or winter, are of course paler colored. The exact shape and extent of the red crown-patch vary greatly in different examples, but this may be owing in a great measure to the "make" of the skin.

## 8. CENTURUS HYPOPOLIUS.

*Picus hypopolius*, WAGL. Isis, 1829, 514.

*Zebrapicus hypopolius*, MALH. Mém. Ac. Metz, 1848–'9, 361; Mon. Pic. ii, 1862, 228; iv, pl. 103, figs. 4, 5 (♂ and ♀ ad.).

*Centurus hypopolius*, LICHT. Nomencl. 1854, 76.—REICH. Handb. 1854, 410, pl. 665, figs. 4413–14 (♂ & ♀ ad.).—LAWR. Bull. U. S. Nat. Mus. no. 4, 1876, 35 (Chapulco, Pueblo).

*Piczèbre alezan cendré*, MALH. ll. c.

*Hab.*—Southern Mexico.

*Adult* ♂: Head, neck, and lower parts, back to flanks and anal region, deep smoky gray, or purplish drab, darkest on the head above, and nape; forehead, chin, and throat lighter, the first inclining to soiled white; eyelids surrounded by a blue-black circle, separated posteriorly by white on the upper eyelid; crown with a quadrate patch of crimson, and lower part of auriculars tinged with the same. Back and scapulars barred with glossy black and brownish white, wing-coverts and secondaries barred with purer white, the white bars broader on the secondaries and outer greater coverts; primaries black (without white on outer webs, except at extreme base of the inner quills, and a very narrow edging to the outer quills), but each bordered terminally with white. Rump and upper tail-coverts white, marked longitudinally with black. Tail black, the inner webs of the *intermediæ* partly white, this crossed by oblique bars of black; lateral tail-feathers barred at ends and on outer webs with white, the next pair with incomplete bars, at end only. Lower part of abdomen, anal region, flanks, and crissum, soiled white, the flanks transversely spotted, or irregularly barred with black, the crissum with irregular V-shaped marks of the same; anal region with smaller, nearly obsolete spots. *Adult* ♀: Similar to the ♂, but lacking the crimson crown-patch. Wing, 4.90–5.00; tail, 3.70; culmen, .85–.90; tarsus, .80. "Iris brown; bill blackish; feet ashy-blue." (SUMICHRAST, MS.)

This species is very peculiar in its coloration, and needs no comparison with any other. Its nearest ally is perhaps *C. elegans*, with which it agrees in the dark color of the breast and the black surrounding the eyes, although *C. uropygialis* is about equally related, in the uniform brown color of the nape, and the squarish crimson spot ornamenting the pileum of the male alone. It is a much smaller and decidedly more delicate species than either of those named, however, and differs widely in other characters of plumage. The absence of any red or yellow tinge on the abdomen, and the *longitudinal* markings of the rump and upper tail-coverts, which characterize this species, are unique features in this genus.

Of the single pair of specimens which I have been able to examine, the female (E. Mus. Salv.-Godm. "Mexico; ex Darmstadt Mus.") differs from the male (Mus. Salv.-Godm. "Valley of Mexico; H. S. Le Strange"), besides in the absence of the red coronal patch, in having much narrower and sparser streaks of black on the rump and upper tail-coverts, and in having the white spots on the outer greater wing-coverts larger, or even so nearly coalesced as to form a broken longitudinal patch.

### 9. CENTURUS ELEGANS.

*Picus elegans*, SWAINS. Philos. Mag. 1827, 439 (♂ ad.; "maritime land" of Mexico).—LESS. Compl. Buff. ix, 1837, 318.—FINSCH, Abh. Nat. Brem. 1870, 356 (Mazatlan).

*Centurus elegans*, GRAY, Gen. B. ii, 1849, 442.—BONAP. Consp. i, 1850, 119; Consp. Zygod. 1854, no. 219.—REICH. Handb. 1854, 411.—SCL. Catal. 1862, 342, no. 2043 (Mexico); P. Z. S. 1864, 177 (city of Mexico).—SCL. & SALV. Nom. Neotr. 1873, 101 (Mexico).—LAWR. Mem. Boston Soc. ii, pt. iii, no. ii, 1874, 294 (Mazatlan, Guadalajara, Tepic, and Sonora; habits).

*Zebrapicus elegans*, MALH. Mon. Pic. ii, 1862, 225; iv, 1862, pl. 102, figs. 5, 6 (♂, ♀ ad.).

*Piczèbre élégant*, MALH. ll. c.

*Hab.*—Western Mexico.

*Adult* ♂: Crown and occiput scarlet-crimson; nape bright orange-yellow, sometimes abruptly defined against the red, often grading in-sensibly into it; bare orbital space surrounded by black, this much broadest above the eye, where forming a large longitudinal patch, widest posteriorly, on each side of the red crown; remainder of the head smoky olive-gray, lighter on the forehead, the frontlet, cheeks, and chin more or less strongly washed with golden yellow; throat, jugulum, breast, sides, and upper part of abdomen, uniform smoky gray; middle of the abdomen stained, more or less deeply, with golden yellow; tibiæ, anal region, and crissum thickly marked with V-shaped bars of black. Upper parts sharply, and rather broadly, barred with black and white, the bars of the two colors nearly equal in width; primaries black, bordered terminally with white, and marked at the base (of outer webs) with large blotches of the same; primary coverts uniform black; lower rump and upper tail-coverts white, with rather distant broad bars of black. Tail black, the *intermediæ* broadly barred, on both webs, with white; lateral pair of rectrices distinctly barred on both webs, to the base, with white, the bars not touching the shaft, however, except near the end of the feather; next tail-feather usually barred on the inner web only, the next two wholly black or with mere indications of bars. *Adult* ♀: No red on the crown or occiput, which are uniform ash-gray, the occiput sometimes (but rarely) blackish, in consequence of the coalescence of the black supraocular patches. *Young* ♂: Similar to the adult, but colors of the head less brilliant, and all the markings of the plumage less sharply defined; light bars of the dorsal region obscured by an olivaceous wash. Wing, 4.50–4.90; tail, 3.10–3.60; culmen, .95–1.10; tarsus, .85–.90.

In this handsome species there is rather an unusual amount of individual variation. In the adult males, the bright Indian-yellow of the nape is usually quite distinctly defined against the red of the occiput and crown; but in one (No. 26991, Mazatlan), only the lower margin of the nape is yellow, the rest being bright red, like the occiput. In this example the frontlet, chin, cheeks, and auriculars are a bright golden yellow, while the jugulum and breast are darker and more olivaceous than in others. In the adult females the red of the crown and occiput is usually wholly replaced by uniform rather light brownish gray; but sometimes (as in No. 23817, Mazatlan, J. Xantus), the whole occiput is black, while it is not unfrequently spotted with this color. Furthermore, in this example, also in two others (Nos. 23752 and 39977, Mazatlan), the nape is intense orange-red with merely a lower border of yellow.

## 10. CENTURUS SUPERCILIARIS.

*Picus superciliaris*, TEMM. Pl. Col. iv, 1838, 433 (♂ ad.).—CUV. Règ. An. ed. 1829, 451.—WAGL. Isis, 1829, 515.—LESS. Traité, 1831, 227; Compl. Buff. ix, 1837, 324.—DRAP. Dict. Class. xiii, ——, 506.—THEINEM. J. f. O. 1857, 153.

*Colaptes superciliaris*, VIG. Zool. Jour. iii, 1827, 445.—D'ORB. La Sagra's Cuba, Ois. 1839, 146, pl. 23 (albinotic ♀ ad.).

*Colaptes superciliosus*, GRAY, Gen. B. ii, 1849, 446.

*Centurus superciliaris*, Bonap. Consp. i, 1850, 118; Consp. Zygod. 1854, no. 214.—Reich. Handb. 1854, 408, pl. 662, figs. 4400 (♂ ad.) 4401 (albinotic ♀ ad.).—Gundl. J. f. O. 1856, 103; Repert. i, 1866, 294.—Scl. Catal. 1862, 342, no. 2042 (Cuba).—Scl. & Salv. Nom. Neotr. 1873, 101 (Cuba).

*Zebrapicus superciliaris*, Malh. Mem. Ac. Metz, 1848–9, 361; Mon. Pic. ii, 1862, 223; iv, 1862, pl. 102, figs. 1 (♂ ad.), 2 (♀ ad.), 3 (♀ ad., alb.).

"*Picus subocularis*, Less, Discr. d'Ois. réc. découv. 1847, p. 205, no. 33, le mâle". (*Malherbe.*)

*Pic sourcil noir*, Temm. l. c.
*Pic à sourcils noirs*, Less. l. c.
*Colapte à sourcils noirs*, D'Orb. l. c.
*Le Pic à plaque noire*, Less. Descr. d'Ois. réc. déc.
*Carpintero jabado* } Vulg.
*Carpintero commun* }
*Le Piczèbre sourcil noir ou superciliare* } Malh. ll. c.
*Pic-zèbre superciliare* }

*Hab.*—Cuba.

*Adult* ♂: Crown, occiput, and nape bright scarlet-crimson, darker anteriorly; frontal feathers, on each side of the base of the culmen, reddish (usually deeply red, occasionally merely stained with this color); a large longitudinal patch of black on each side of the crimson crown, the lower edge bordering the bare orbital space, and extending from the anterior angle of the eye back as far as the occiput; remainder of the head dull whitish, including a distinct and usually broad band across the forehead; white purest on auriculars and forehead, more tinged with light buffy-gray on the throat, this changing gradually to a deeper shade of the same on jugulum, the breast, sides, and abdomen deeply buffy drab, tinged with golden buff posteriorly; middle of the abdomen bright red; flanks, tibiæ, anal region, and crissum varied with V-shaped marks of black. Back, scapulars, and wings broadly barred with black and white, the dorsal region strongly washed with buff-yellow; rump and upper tail-coverts white, often tinged with pink and buff yellow, the former with transverse bars, the latter with V-shaped marks of black; tail black, the inner webs of the *intermediæ* white, with broad, rather oblique, bars of black, the outer webs with a longitudinal stripe of white, narrow and pointed posteriorly, often barred with black anteriorly; lateral pair of rectrices marked with broad bars, or transverse spots, of white, not touching the shaft except the terminal and (rarely) the subterminal spots; inner webs with one or two broad bars of white near the end. Primaries black, the outer webs blotched with white near the base. *Adult* ♀: Similar to the ♂, but anterior part of the crown white, like the forehead, the occiput and posterior part of the crown black, this confluent with the black superciliary patches; bill blackish; feet olivaceous dusky. Wing, 5.40–6.00; tail, 4.50–4.80; culmen, 1.30–1.65; tarsus, 1.00–1.10.

The unique characters of this very distinct species consist in the large size (largest in the genus), superciliary black patches combined with scarlet nape and red frontlet; equal width of the light and dark bars of the upper surface (in this respect most resembling *C. carolinus*), and the distinct buff-yellow wash which pervades the dorsal region.

## 11. CENTURUS STRIATUS.

*Picus dominicensis striatus*, Briss. Orn. iv, 1760, 65, pl. iv, fig. 1 (♂ ad.).
*Picus dominicensis striatus minor*, Briss. t. c. 67, pl. iii, fig. 2 (♀ ad.).
*Picus striatus* Müll. S. N. Suppl. 1776.—Bodd. Tabl. P. E. 1783 (ex Pl. Enl. 281, 614).—Gmel. S. N. i, 1788, 427.—Lath. Ind. Orn. i, 1790, 238.—Valenc. Dict. Sc. Nat. xl, —, 173 (♀).—Vieill. Ois. Am. Sept. ii, 1807, pl. 114 (♂ ad.); Nouv. Dict. xxvi, 1818, 90; Enc. Méth. 1823, 1316.—Cuv. Règ. An. i, 1829, 451.—Drap. Dict. Class. xiii, —, 505.—Wagl. Syst. Av. 1827, no. 40 (♂ & ♀).—Less. Traité, 1831, 227; Compl. Buff. ix, 1837, 324.—Bryant, Pr. Boston Soc. xi, 1866, 96 (St. Domingo).
*Centurus striatus*, Gray, Gen. B. ii, 1849, 442.—Bp. Consp. i, 1850, 119 (♀); Consp. Zygod. 1854, no. 216.—Reich. Handb. 1854, 409, pl. dclxiii, figs. 4404–5 (♀).—Scl. & Salv. Nom. Neotr. 1873, 100 (Hayti).
*Zebrapicus striatus*, Malh. Mon. Pic. ii, 1862, 231; iv. pl. cvii, figs. 3, 4, 5 (♂ & ♀ ad.).
*Le Pic rayé de St. Domingue*, Briss. Orn. iv, 1760, 65, pl. 4, fig. 1 (♂ ad.).
*Le petit Pic rayé de St. Dominigue*, Briss. t. c. 67, pl. 3, fig. 2 (♀ ad.).
*Pic rayé, de St. Domingue*, Buff. Pl. Enl. 281 (♂ ad.).
*Pic rayé à tête noir de St. Domingue*, Buff. Pl. Enl. 614 (♀ ad.).
*Le Pic rayé*, Vieill. *ll. c.*—Valenc. *l. c.*—Less. *l. c.*
*Piczèbre rayé ou de Saint-Domingue*, Malh. l. c.

*Hab.*—Island of St. Domingo or Hayti, only.

*Adult* ♂: Crown, occiput, nape, lower part of rump, and upper tail-coverts deep blood-red or scarlet-crimson, the red of the nape extending over the sides of the neck to a point immediately behind the auriculars; sides of the neck below this with two longitudinal stripes of dingy white, separated by a black one of about equal width; the posterior white stripes of opposite sides separated by a black space on the extreme lower part of the nape. Remainder of the head, smoky gray, gradually becoming smoky drab or brown on the jugulum and breast, this in turn passing gradually into light yellowish olive-green on the abdomen, anal region, crissum, sides, and flanks, all of which are immaculate.* Back, scapulars, and upper part of rump sharply banded with deep black and bright yellowish olive-green, the black bars broadest, except on the rump. Wings black, the coverts banded with greenish buff, the secondaries with golden buff; outer webs of primaries spotted with pale buff. Tail uniform black, the lower surface dull hoary olivaceous. Bill plumbeous-dusky, the mandible paler (probably bluish white in life); feet olivaceous or plumbeous. ♀: Similar, but crown deep black, the red of the head and neck being confined to lower part of occiput and upper half of nape. Wing, 4.30–5.20; tail, 3.35–4.10; culmen, 1.00–1.30; tarsus, .90–1.00.

This is the only *Centurus* having red on the rump or upper tail-coverts, and the only one, excepting *C. hypopolius*, without a decided red or yellow wash on the middle of the abdomen. In the bright yellow-green color of the lighter bars of the mantle, and in the longitudinal black and white stripes of the lower hind-neck, it is entirely peculiar in the genus; but in all the essentials of form, as well as the general style of coloration, it is a true *Centurus*.

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* In some examples the lower tail-coverts have indistinct dusky shaft-streaks.

## APPENDIX.

In addition to the species given in the above synopsis, Malherbe, in his *Monographie des Picidées* (ii, 1862), gives, besides *Melanerpes pucherani*, which he includes in this genus, two additional species of "*Zebrapicus*," viz: "*Z. gerinii* (Temm.)" and "*Z. aurocapillus* (Vig.)." They may or may not belong to the genus *Centurus*, in the restricted sense; and since I know nothing of either from autoptical acquaintance, I transcribe below Malherbe's account of each in full, as embodying all that is known regarding these doubtful species.

### ZEBRAPICUS GERINII (Temm.).

*Picus varius indicus;* GÉRIN, *Ornith.*, ii, p. 48, pl. 171.
*Picus carolinus*, VAR. D; LATH., *Ind orn.*, i, p. 231, *spec.* 18.
*Picus gerinii;* TEMM., pl. color., 73e livr., article du *P. superciliaris.*

MAS ADUL.—Albo nigroque supra variolosus; pileo, nuchâ abdomineque coccineis; fronte colloque subtùs flavo-griseis; lineâ nigrâ a naribus per oculos ad humeros utrinque ductâ; tergo et uropygio feré tolis albis; remigibus rectricibusque nigris

### LE PICZÈBRE DE GÉRIN.

"Cette espèce, que nous ne connaissons que par la description qu'en donne Gérin et que reproduit Latham, tout en faisant une variété du *Zebrapicus carolinus*, m'aurait paru être le Piczèbre capistrate de M. Lichtenstein, si Gérin n'annonçait pas qu'une *bande noire descend des narines jusqu'aux épaules, en passant sur les yeux.* Ce caractère rapproche donc ce Piczèbre de *l'elegans* de Swainson, du *superciliaris*, de *l'hypopolius* et de mon *pucherani*, qui, tous, ont les yeux entourés de noir.

" M. Temminck nomme seulement ce grimpeur dans son article sur le *superciliaris* (pl. col. 433); mais il paraît ne l'avoir jamais observé et ne le connaître que par la description de Gérin.

" Nous n'avons aucun renseignement sur *l'habitat* précis de cet oiseau américain.

"*Coloration.—Le male*, d'après Gérin et Latham, a les paties supérieures rayées transversalement de noir et de blanc; le dessus de la tête, la nuque et le milieu de l'abdomen, sont rouges; le fronte et le dessous du cou sont d'un gris jaunâtre, une bande noire s'étend de chaque côte du cou, à partir des narines jusqu'aux épaules et en couvrant les yeux; les rémiges et les rectrices sont noires; le milieu du dos et le cropion sont presqu'entièrement blancs.

" *La femelle* n'a pas été décrite par les auteurs.

"*Habite* l'Amérique, sans pouvoir indiquer dans quelle contrée, probablement le Mexique ou l'Amérique centrale.

"*Dimensions.*—Gérin et Latham n'ont indiqué les dimensions même approximatives de cette espèce, qui semble se rapprocher pour la taille du *Zebrapicus carolinus*, puisque Latham en fait une variété.

"On ignore ce qu'est devenu l'exemplaire décrit par Gérin et Latham."

### ZEBRAPICUS AUROCAPILLUS (Vig.).

*Picus aurocapillus;* VIG. *Proceed. Zool. Soc. Lond.*, 1832, p. 4.—LESS., *Compl. Buff.*, ix, p. 315.

*Picus aureocapillus;* GAY ex VIG., *Hist. fis. de Chile*, 1847; *Zool.* p. 373.

FÆMINA? Supra ater, albo fasciatus maculatusque; striga lata supra oculos ad humeros extendente, alteraque suboculare interruptâ, gulâque albis; pectore abdomineque sordidè albescentibus, strigis parvis fuscis notatis; capite atro; fronte aureo strigatim notato, vertice aureo.

### LE PICZÈBRE A TÊTE DORÉE.

*Pic a tête dorée;* LESS., Compl. Buff., ix, p. 315.

"Cette espèce, du Mexique, ne nous est connue que par la description qu'en donne M. Vigors dans les *Proceedings of the Zoological Society of London*, et je ne l'ai observée dans aucune collection d'Europe. Je dois ajouter que je ne suis pas même certain, quoique cela soit probable, que cette espèce appartienne au groupe dans lequel j'ai cru devoir la faire figurer, en égard à sa coloration, la description de l'auteur anglais étant très-sommaire. Ce grimpeur est plus petit que notre *Z. pucherani*, dont il diffère surtout par l'absence de rouge sur la tête et sur l'abdomen.

"Je suis très-porté à croire que le sujet décrit par M. Vigors etait une femelle, et que l'espèce ne se trouve point au Chili, comme en doute aussi M. Gay, tout en la décrivant d'après Vigors.

"*La femelle?* Corps noir au-dessus, tacheté et rayé transversalement de blanc; audessus des yeux, une large bandelette blanche qui s'étend jusqu'aux épaules, et une seconde interrompue, de même couleur, sous les yeux; la gorge est aussi de cette dernière couleur; le thorax et le ventre sont d'un blanchâtre sale avec quelques stries brunes; la tête est noire avec des rayures jaunes sur le fronte, et le sommet de la tête jaune d'or.

"*Habite* le Mexique.

"*Dimensions.*—Longueur totale, 165 millimétres (les autres dimensions ne sont pas indiquées).

"Cette espèce figurait dans la collection de M. Cuming, que je n'ai malheureusement pu examiner, et ce dernier l'avait reçue du Mexique."

SMITHSONIAN INSTITUTE,
*January*, 1881.

## OBSERVATIONS ON SIREDON LICHENOIDES.

### By WM. E. CARLIN.

Como Lake is a body of water about two miles and a half in circumference. It has no known outlet, but is fed by a stream of pure spring water about 2 feet wide and a foot deep, which, continually running, prevents the lake's absorption by evaporation. The lake is quite shallow and can be easily waded at almost any part, being not more than 10 feet deep in the deepest place that I have been able to find. The bottom of the lake is soft and is covered in most places with grass and weeds. The water is strongly impregnated with alkali, and a large number of cattle are said to have died a number of years ago from drinking it. It is very disagreeable to the taste. The amount of water varies about 14 inches during the year, being highest in the spring from the melting snows, and lowest in the autumn. This is the home of the *Siredon lichenoides* (Baird). They never enter the stream of fresh water, preferring the alkali water of the lake. They seem to suffer no inconvenience, however, if placed in fresh water. I have caught as many as a hundred and fifty and placed them in a cauf, and have never had one die from the change. The change to fresh water undoubtedly hastens the metamorphosis into the *Amblystoma* form, as I have noticed quite a change in the course of twenty-four hours in individuals placed in the cauf, while an equal number kept in the alkali water in the boat have shown no change in any of them in several days. I have kept six at different times in jars of fresh water until they have completed their metamorphosis. I made no systematic note of appearance from day to day, but my observation was careful and regular. In two cases the change in external appearance was so abrupt that I would have been almost certain that another salamander had been substituted for the one in the jar had I not had him so completely under observation that it was impossible. The gills had assumed a stubby form about half the length that they were the night before, and the gill on the back of the body was nearly half gone; it took air quite often, and I removed it from the jar and placed it in a box with some lake grass around it to keep it moist. It completed the metamorphosis in a few days. I did not feed it any during this time. While it was in the jar it was well fed with flies. The jar was placed upon a table in the telegraph office. The flies at first had to be pushed in front of it with a pencil. It finally got to know that tapping the jar with a pencil meant a fly, and would rise to the surface immediately and snap at whichever it saw first, pencil or fly. It furnished train-men continual amusement while here, and they kept it constantly gorged. Those that I kept well fed in jars and seldom changed the water, say once in three days, usually began to show a slight change in from two to three weeks, and all of them completed the change into the *Amblystoma* inside of six weeks, while I have had but three changes of those kept in the cauf (sixty of them) in three months. During that time they have not been fed at all. The *Siredon mexicanus* is said to never undergo the transformation in its home, and Professor Marsh doubts that it ever makes it here. This doubt I can put at rest. They do make the change here, and in large numbers. During the latter part of the month of July and the entire month of August, if the day is rainy or misty, they come from the lake in to the shore in large numbers, and secrete themselves under some piece of wood or rock where they can keep moist. Sometimes they venture out in a shower, and the sun catches them before they can obtain shelter either in the lake or under cover, and in a few minutes kills them. They can be found dried hard anywhere about the lake, on the shore or in the grass. While catching *Siredon* I have seen and caught a number of *Amblystoma* in the lake, with the metamorphosis, as far as I could see, as complete as those we find half a mile from the lake. They cover the ground by thousands during a warm summer rain, coming from every conceivable place where they could have found shelter, from under rocks, boards, old ties, and out of gopher holes. I have a cat that eats them greedily. She has fished several out of jars on the table and devoured them during the night when there was no one to watch her; and I am told by a resident that the numerous skunks that live around the lake live principally on them. They are of two colors, a blackish green and a yellowish green color. I have had two of the blackish green complete the change in sequence, while one of the yellowish green was completing it under the same circumstances of change of water and food. I think this will be found to be the result in all similar cases. I have caught them in all stages of growth and in all stages of their changes into the *Amblystoma* state. During the months of July and August they lie close to the shore of the lake, where it is shallow; but after the first frost they disappear completely, or at least I have never been able to find them. I think they must bury themselves in the mud at the bottom of the lake, as I have stirred up the grass often and have not seen them issue from it.

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## ON THE DESTRUCTION OF FISH BY POISONOUS WATER IN THE GULF OF MEXICO.

**By JOSEPH Y. PORTER, Assistant Surgeon, U. S. A.**

UNITED STATES ARMY HOSPITAL,
OFFICE OF POST SURGEON, KEY WEST BARRACKS, FLA.,
*January* 21, 1879.

PROFESSOR: I forward you to-day by express a small box containing a quart of Gulf water, procured 20 miles from this port. I enclose you a slip of paper taken from the "Key of the Gulf," a local of this place, which in its turn clipped it from the "Forest and Stream." It seems to be the general opinion in this section among non-scientific men that the destruction of fish has been due to the saturated condition of the water with dogwood (*Cornus Florida*). I am informed that the shores of Lake Okheechobee abound in this vegetation, as well as the country around it; and as the land was completely overflowed last year—summer—some couple of hundred miles in that vicinity, water 4 and 5 feet deep, it is thought, as it remained some little while before running off, that some of the properties of the *Cornus* may have been imparted to the water, and this in its turn contaminated the Gulf water. However, this is a mere conjecture, and may not be any nearer the truth than a theory advanced by a "Partington" of this place, viz, that the fatality of the fish was due to a *vulgar corruption* (volcanic eruption) of the Everglades. The fishermen have suffered terribly in consequence of this calamity, returning to port trip after trip with their "wells" full of dead fish. They say that they meet with good success in catching the fish above Pine Island, Charlotte Harbor, and are able to keep them alive until returning, preparatory to going to the Havana market. They meet with this belt of poisoned water between this port and Punta Russa, and immediately on entering or attempting to cross it their fish come to the surface, gasp, and die.

I trust that as soon as the water I sent you shall be analyzed you may be pleased to inform me; for which favor I shall be deeply grateful.

I am, Professor, very respectfully, your obedient servant,

JOSEPH Y. PORTER,
*Assistant Surgeon U. S. A., Post Surgeon.*

Prof. SPENCER F. BAIRD,
*Washington, D. C.*

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### THE FISH MORTALITY IN THE GULF.

JACKSONVILLE, FLA., *December* 26, 1878.

EDITOR FOREST AND STREAM:

In reply to your communication soliciting information regarding the mortality among the fish on the coast and ocean near the Keys, I can only say that from personal observation I have none to communicate. Through the public press I have noticed that fish have been dying in immense quantities for some time.

By some the mortality is attributed to the freshness of the water as a consequence of the heavy rains of the past summer and autumn. But in my opinion this explanation will not suffice, as the main outlets of the Okheechobee empty into the ocean north of Pavillion Key, and that sheephead, tarpum, channel bass, and mullet visit and live in brackish and even fresh water. By some it has been attributed to volcanic action, and by others to the breaking forth of a subterranean stream, the waters of which are poisonous. One fact is positively known, and that is that fish in enormous quantities are dying over a large extent of the

Gulf from the effects of something contained in the water—be that something deleterious gases, mineral substances held in solution, or fungi.

The fishing interest of Key West is an important one, for it supplies thousands with the means of subsistence, and if the fish mortality should continue it will bring privation and suffering to many a family.

It appears to me that the existing mortality among the fish is a matter of scientific importance, and should be thoroughly investigated. I would suggest the advisability of the Revenue Department or the Smithsonian Institution sending a commissioner to investigate the cause of the mortality. The government has a dispatch boat at Key West which could be spared for the purpose, and the expense would be trifling. As a matter of scientific interest, independent of its commercial importance, this subject demands investigation.

I remain yours, truly,

C. J. KENWORTHY.

We warmly second Dr. Kenworthy's suggestion, and hope the government will permit the use of facilities for investigation which it appears to have in readiness at Key West. We have already hinted that the use of fluorescine in those waters of Florida which empty into the Gulf might serve to indicate the origin of the boiling spring, whose discovery somewhere off the Gulf coast was announced two months ago. If such a volcanic spring exists, the poisoning of the water can easily be accounted for; though the remedy to prevent continued mortality of the fish is not so readily found. The locality of this boiling spring was given by the Key West Key of the Gulf, of November 6, or thereabouts, as "along our bay coast from two to ten fathoms out." This is not very definite, but it is the most positive designation that we have seen. No authentic information seems to have been derived from any other source. The fishermen whose occupation has been cut short so suddenly should devote their leisure time to efforts to determine the locality of the obnoxious cause, wherever or whatever it is, and report at once to the revenue station at Key West, thereby seconding the efforts of the government to remedy the evil. It will be a direct way of putting bread in the mouths of their now starving families. The polluting substance, whatever it may be, is evidently most subtle, for its influence is seen for a distance of 200 miles, dead fish covering the surface of the ocean wherever the eye rests. One proof of its volcanic origin is that the water so polluted is of a "red brick color," at a distance of less than a mile from the shore, while the interval of water along the land is natural in color and taste. Of its subaqueous origin there can be no doubt, but whether it has connection with waters in the interior of Florida by subterranean passages, or has a deeper and independent source and seat, is what we wish to know. The phenomenon in itself is not wonderful or incomprehensible, being only a reproduction of boiling springs in all parts of the globe, both in land and ocean. Off Matanzas there is an immense spring, not hot, but of clear, cold, pure water.—*Forest and Stream.*

## AN ANALYSIS OF WATER DESTRUCTIVE TO FISH IN THE GULF OF MEXICO.

### By F. M. ENDLICH.

SMITHSONIAN INSTITUTION,
*Washington, D. C., April* 5, 1879.

SIR: Having completed the examination of sea-waters from the Gulf of Mexico, so far as the scant supply would permit, I have the honor to offer the following report thereupon, the water in which the fish die being designated as A, the good water as B:

| | A. | B. |
|---|---|---|
| Specific gravity | 1.024 | 1.022 |
| Solid constituents (total), per cent | 4.0780 | 4.1095 |
| Ferric compounds, per cent | 0.1106 | 0.0724 |
| Injurious organic matter | ratio=3 | ratio=2 |

I find that the water A contains a large quantity of *Algæ* and *infusoria.* It is eminently probable that the former may have had an injurious effect upon the fish. Specimens of the algæ have been submitted to Professor Goode, who will send them to some expert, in order that their specific character may be determined.

The "dead fish" in possession of the United States National Museum are such that any examination of the organs of respiration will be of no avail.

I cannot find, even by spectroscopic analysis, any mineral constituents in the water A which could noxiously affect the fish.

In my estimation the death of fish was caused by the more or less parasitic algæ, which are found in large quantities in water A, but do not occur at all in water B.

In case the same phenomenon should recur, the presence of an expert in the questions involved, more particularly chemistry and botany, would most likely lead to definite results.

Respectfully,

F. M. ENDLICH.

Prof. S. F. BAIRD,
*Secretary Smithsonian Institution,*
*Washington, D. C.*

## FISH MORTALITY IN THE GULF OF MEXICO.

### By M. A. MOORE.

BRAIDENTOWN P. O., MANATEE COUNTY, FLORIDA,
*November* 30, 1880.

SIR: I hope you will excuse the liberty I take in writing you this letter, but on yesterday Maj. W. I. Turner gave me a blank circular of yours and asked me to fill out the queries for him, which I did, and thought no more of it at the time. But on thinking the matter over I have come to the conclusion that there is a matter here that might be of some interest to your commission, as it is one of most vital importance to many here.

You are doubtless aware that we have employed here a number of vessels as fishing-smacks, ranging from 30 to 50 tons, whose vocation it is to carry live fish to the Cuban markets. This industry provides occupation and subsistence for a large portion of our population in South Florida.

About two years ago certain portions of our Gulf waters became poisoned in some way that caused the death of all the fish that came in contact with it. Whenever a smack with a full fare, *i. e.*, a full cargo of fine healthy fish in her well, sailed into this poisoned water every fish would die, and they would have to be thrown away. This compelled the vessel to return to fishing, at the loss of a month's hard work.

This state of affairs has occurred again; the waters of some portions of the Gulf becoming so noxious as to kill the fish. The poison seems to be confined to certain localities and currents for the time being, as sometimes this state of affairs is observed more marked at one place and sometimes at another. However, there seems to be more of it about the mouth of Charlotte Harbor and off Punta Rassa than elsewhere.

When this condition of water prevails, the surface of the water is covered with dead fish, and the beach is covered with them in such numbers that sometimes the stench is intolerable. During its prevalence two years ago the military commander at Fort Jefferson on the Tortugas had to make daily details to carry off the dead fish thrown up on the beach for fear it would breed a pestilence.

I live immediately on the beach of Palma Sola Bay, and some two weeks ago the beach was covered with dead fish. The only thing that seems to be inexplicable is that this water seems to affect what are termed here bottom-fish more than any others. The principal game of the fishing-smack are the grouper (*Serranus nigritis*), and the snapper (*Serranus erythrogaster*). These, with the perch, king-fish, trout, and all those fish which take the hooks seem to be much more affected than the mullet (*Mugil lineatus*), or the pompano (*Bothrolæmus pampanus*). In our parlance here fish that take the hook are called bottom-fish in contradistinction from those that go in schools and are taken with the net, and the bottom-fish seem to be more affected by this water than the others. Numbers of sharks and rays, eels and catfish are thrown up dead on the beach.

I am not aware that there has been any report of this matter made to your commission, or any attempt made at the analysis of the water, and would not have taken the liberty of writing, save for the fact that the greater part of our fishermen are comparatively illiterate. My own opinion is that the state and condition of the water are caused by some volcanic action at the bottom. I may be wrong in my technical names of the fish, but our fish have never been properly classified, and I give you the best I can do.

With a renewed apology for the liberty I have taken, I remain, most respectfully,

M. A. MOORE.

Professor BAIRD,
*Commissioner of Fish and Fisheries, Washington, D. C.*

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## ON THE DESTRUCTION OF FISH BY POLLUTED WATERS IN THE GULF OF MEXICO.

### By W. C. W. GLAZIER, Assistant Surgeon, M. H. S.

TREASURY DEPARTMENT,
OFFICE SUPERVISING SURGEON-GENERAL
UNITED STATES MARINE HOSPITAL SERVICE,
*Washington, D. C., December* 7, 1880.

SIR: I have the honor to transmit herewith copy of a letter received on the 3d instant from Assistant Surgeon W. C. W. Glazier, of this service, now on duty at Key West, which it was thought might be of interest to you.

Very respectfully,

JOHN B. HAMILTON,
*Surgeon-General U. S. Marine Hospital Service.*

Prof. S. F. BAIRD,
*Commissioner of Fish and Fisheries, Washington, D. C.*

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UNITED STATES MARINE HOSPITAL SERVICE,
DISTRICT OF THE GULF, PORT OF KEY WEST, FLA.,
*Surgeon's Office, November* 25, 1880.

SIR: I have the honor to report, as a matter of scientific interest, that it has occurred several times that fishermen returning from the coast of Florida with fish, in an apartment of their boats communicating freely with the surrounding water, have had them die suddenly on reaching a certain kind of water distinguishable by its color. This has occurred several times, notably about 1865 and in 1878, when large numbers were thrown on the shore at Key West, many of them of very large size, so that perhaps all that came within the influence of the poisoned water perished sooner or later.

There is nothing known as to the origin of the poisonous qualities of the waters that affect the fish in this way, but the prevalent opinion seems to be that there is something emptied into the beds of the fresh-water courses from volcanic or geyser-like springs, and that as soon as the water thus impregnated reaches the sea it kills every living thing that comes under its influence.

It has been reported that several smacks have lost their cargoes within the last two weeks, and that the waters of Tampa, Sarasota, and Charlotte Harbor were covered with thousands of dead fish, and that the stench was so great that the vessels were obliged to keep free from them.

Very respectfully,

W. C. W. GLAZIER,
*Assistant Surgeon, M. H. S.*

The SURGEON-GENERAL U. S. MARINE HOSPITAL SERVICE,
*Washington, D. C.*

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## NOTES ON SOME FISHES FROM HUDSON'S BAY.

### By TARLETON H. BEAN.

Two small collections of fishes collected in the Hudson's Bay region, and received by the United States National Museum in 1880, are worthy of note, because fishes from that quarter are rarely added to museums in the United States, and consequently our knowledge of the fauna is limited.

One of these lots embraces the following four species, presented by Walton Hayden, esq., from Moose Factory. The numbers at the left of the name of the species refer to the Museum Fish Catalogue.

27782. PERCOPSIS GUTTATUS Ag.

The dorsal has 9 to 11 developed rays; the anal i, 7; ventral 8; scales in lateral line 47 to 48. Seven specimens were obtained.

27783. STIZOSTETHIUM VITREUM (Mitch.) Jord. & Copeland.

Two young examples about 3½ inches long.

27784. ACIPENSER MACULOSUS LeS.

A young individual 4⅘ inches long.

27785. URANIDEA SPILOTA Cope.

One specimen measuring 4 inches without the tail, which is wanting. Vomerine teeth only. D. ix, 18; A. 12; V. i, 4.

From Robert Bell, M. D., Assistant Director of the Geological Survey of Canada, have just come the following six species, all of them collected at the mouth of Nelson River except *Cottus labradoricus*, which is from near York Factory. As the last species has figured among the doubtful ones in our lists of East Coast fishes, I give a somewhat detailed description of it.

27776. PERCOPSIS GUTTATUS Ag.

27777. STIZOSTETHIUM VITREUM? = (*Lucioperca americana* Cuv.)

The example is very young and entirely without scales, but the species is most probably *vitreum.*

27778. GASTEROSTEUS PUNGITIUS L. = (*Pygosteus occidentalis* [C. & V.] Brev.).

This is the form described as *G. nebulosus* by Agassiz. It does not differ from marine *pungitius* except in its fresh-water habits.

27779. GASTEROSTEUS ACULEATUS var. GYMNURUS Cuv.

The few scaly plates on the anterior part of the body are present, but rudimentary.

27780. COTTUS LABRADORICUS (Girard).

Taken near York Factory, Hudson's Bay, by Robert Bell, M. D., Assistant Director of the Geological Survey of Canada, 1880.

Br. vi; D. X, 14; A. 14; V. i, 3; P. 17; C. 11 (developed).

Two small spines above the snout; a rough irregular prominence above each orbit and two similar ones on the occiput. The slight depression on the crown becomes narrower posteriorly where its width is about one-half the length of the space included between the supraorbital and occipital prominences. *Four preopercular spines*, two of which are at the angle; the uppermost and longest is two-thirds as long as the eye, but the spine is slightly imperfect; the two lower spines are short and extend downward and slightly forward. The length of the longest preopercular spine equals the distance between the eyes measured on the bone. The long diameter of the eye is one-fifth of the length of the side of the head, and nearly equal to the length of the snout. The maxilla is twice as long as the eye, about half as long as the head to the end of the opercular spine, and extends to about the vertical through the hind margin of the eye. Teeth on the vomer, none on the palatines. The dorsal spines are slender; the first is twice as long as the distance between the eyes; the third and longest is five-sixths as long as the maxilla and one-half as long as the distance from the tip of the snout to the end of the occipital prominences. The length of the spinous dorsal base is one-fourth of the total length without caudal. The interval between the spinous and soft dorsals is one-half as long as the eye. The longest ray of the soft dorsal (9th) is about as long as the middle caudal rays, or one-sixth of the total length with caudal. The pectorals reach a little beyond the origin of the anal (to the second ray of the anal); the ventrals are as long as the postorbital part of the head and do not reach near the vent. Skin above the lateral line with a few spiny tubercles, none of them more than one-fourth as long as the eye. The specimen sent is a dried individual and its colors cannot be made out. There is a small slit behind the fourth gill. The local name at York Factory is "Miller's Thumb," according to Dr. Bell.

27781. COREGONUS ARTEDI LeS. var.

The species agrees in all respects with typical *Artedi* from the Great Lakes with the exception of its smaller eye. Two larger examples collected at Moose Factory many years ago also have the eye notably smaller than in *C. Artedi*. The local name at York Factory, says Dr. Bell, is "*tulibi*." It must not be inferred, however, that the species is at all like *Coregonus tullibee*, for it is not closely related to this form. Specimens in alcohol are much desired.

U. S. NATIONAL MUSEUM,
*Washington, D. C., March* 28, 1881.

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## ON THE MINERALOGICAL COMPOSITION OF THE NORMAL MESOZOIC DIABASE UPON THE ATLANTIC BORDER.

### By GEORGE W. HAWES, Ph. D.

In my opinion the Mesozoic "trap rocks" have excited more interest and received more lithological attention than any other defined rock species upon the Atlantic border. There is, therefore, no rock concerning the geological features and chemical composition of which we are so well informed; but much as it has been discussed, the mineralogical composition has, in part, remained a matter of speculation rather than of definite knowledge. As our methods for determining such points are now much more satisfactory, I think that the final determination of the mineral composition of the normal variety of this rock may be accomplished, and this will be of much interest on account of the wide distribution and the uniform character of these diabases.

I will give a few references to show the development of our knowledge of these rocks and the essential uniformity in their composition.

When Perceval wrote, no attempt was made to determine their composition, and their geological features and distribution were chiefly considered.[1]

Prof. J. D. Dana has at different times pointed out the wonderful uniformity of these rocks wherever they occur, intersecting the Mesozoic sandstones on the Atlantic border.[2] He quotes specific gravity determinations by Professor Brush of New Haven, Professor Cooke of New Jersey, Professor Kerr of Raleigh, N. C., and Professor Howe of Nova Scotia, made upon specimens from their respective localities, and which are essentially alike. Professor Dana considered these rocks as composed of pyroxene, magnetite, and labradorite.

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[1] See Dana's Geology, page 20.

[2] American Journal of Science, series iii, vol. vi, page 104.

Professor Howe[1] soon afterward made further determinations of specific gravity with the view of illustrating more fully the uniformity of this composition.

Chemical analyses of these rocks have been made by Prof. G. H. Cooke,[2] Prof. W. G. Mixter,[3] S. T. Tyson,[3] and Dr. F. A. Genth,[4] which are all nearly concordant, and show the ultimate composition to be always nearly the same.

The most extensive series of analyses has been made by myself[5] upon specimens taken from various points in the Connecticut Valley, and a specimen from Jersey City, which was intended to represent the Hudson palisades. These analyses demonstrated the essential uniformity of the composition, all variations being referable to the degree of hydration which represents the extent of the decomposition of the rocks, and the degree of alteration of its pyroxene to chlorite. I concluded that the feldspar was labradorite, but demonstrated that the large kernels in one variety were of anorthite.

Prof. E. S. Dana[6] began the microscopic examination of these rocks. He confirmed the determination that these rocks are composed of augite, triclinic feldspar, and an iron oxide, and assumed from my analysis that this feldspar was labradorite. Notwithstanding this, these rocks are stated to this day by Credner[7] to be diorites, that is, hornblendic rocks.

Mr. P. Frazer[8] has discussed my analysis of West Rock together with the analysis by Professor Genth. He assumed the feldspar to be a labradorite of normal composition, and calculated that labradorite and augite were present in equal proportion.

From these works it is then evident that the unaltered Mesozoic diabases are all very much alike, and are composed of augite, iron oxide, in the form of magnetite and titanic iron, and a feldspar that has been reasoned to be labradorite.[9] This latter determination is in need of verification.

The method employed by me for this determination was that proposed by Dr. Thoulet, which, though not invented by him, was brought into general notice by his more successful development of the method.[1]

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[1] Philosophical Magazine, February, 1876.

[2] Geological Report, New Jersey, page 215.

[3] American Journal of Science, iii, vol. vi, page 105.

[4] 2d Geological Survey of Penna. report of progress in York and Adams counties, page 120.

[5] American Journal of Science, 1875, vol. ix, page 185.

[6] Proc. Am. Association Adv. Sci., Aug., 1874.

[7] Credner, Géologie, page 532. With his ill-defined definition of melaphyr, to which he refers a part of these rocks, they certainly have nothingto do. These rocks had long been demonstrated to be augitic when the last edition of his work appeared, which still states the palisades to be of diorite.

[8] 2d Geological Survey of Penna., vol. C, report of progress in the district of York and Adams counties.

[9] I speak now only of its essential original constituents. Biotite and hornblende

In a solution of iodide of potassium, iodide of mercury was dissolved, and the sp. gr. of the resultant fluid was 3.18.[2] Some of the diabase from Jersey City, which is particularly fresh, was pulverized till all the grains would pass through coarse muslin. From this powder the dust was separated by washing in water, and the mass of uniformly fine grains was put into the fluid, when the iron oxide and augite sank to the bottom and only feldspar remained on the top. I diluted till the sp. gr. decreased to 3, when some grains of a compound character settled out, and the microscope indicated that the floating mineral was entirely of feldspar. I diluted and made the gravity 2.90, and nothing of consequence fell down, neither did any considerable portion settle from the mass till the sp. gr. had reached 2.69, when at this point the mass of feldspar, on being mixed with the fluid as before, separated into two parts with such facility as to plainly show that two minerals were present. Further experiments on the parts did not result in any further separations, and it was therefore decided to analyze these parts. These analyses were performed by Dr. A. B. Howe, of the Scientific School at New Haven, and were found to be composed as follows:

FELDSPAR IN JERSEY CITY DIABASE.

| Sp. Gr. over 2.69. | | | Sp. Gr. under 2.69. | | |
|---|---|---|---|---|---|
| $SiO_2$ | 52.84 | .88 | $SiO_2$ | 60.54 | 1.01 |
| $Al_2O_3$ | 28.62 | .278 | $Al_2O_3$ | 24.11 | .234 |
| $Fe_2O_3$ | 1.52 | .009 | $Fe_2O_3$ | 1.14 | .007 |
| CaO | 11.81 | .21 | CaO | 9.15 | .163 |
| MgO | .46 | .01 | MgO | .27 | .107 |
| $Na_2O$ | 2.38 | .038 | $Na_2O$ | 4.11 | .066 |
| $K_2O$ | .86 | .009 | $K_2O$ | 1.06 | .011 |
| $H_2O$ | 1.06 | | $H_2O$ | .59 | |
| | 99.55 | | | 100.97 | |

Sp. Gr. over 2.69:

$R O : R_2O_3 : SiO_2$
1 1 3.3
$R_2O : RO$
1. 4.7

Sp. Gr. under 2.69:

$R O : R_2O_3 : SiO_2$
1 96 4.09
$R_2O : R O.$
1. 2.2

It is therefore plain that the feldspathic element in this rock is not any single feldspar. One of the feldspars is very plainly labradorite, and the other has the ratio of andesite. The two feldspars were dis-

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have been found in small amount in some specimens. Apatite is uniformly present as a minutely microscopic constituent, and the whole sequence of zeolites and chlorites with quartz, calcite, and other minerals, are present as decomposition products, but as a rule it is a monotonously uniform mixture of the above three minerals.

[1] Theséѕ présentées à la faculté des sciences de Paris, pour obtenir le grad de docteur. Contributions à l'étude des propriétés physiques et chimiques des mineraux microscopiques. Par M. J. Thoulet.

[2] This result was obtained by uniting the proportions recommended by Victor Gold, schmidt, Ueber Verwendbarkeit einer Kaliumquecksilberjodidlösung, &c. Inaugural Dessertation zu Heidelberg, Stuttgart, 1880.

tinguishable under the microscope, and the optical properties of the grains offered no peculiarities to conflict with the above determination.

The analysis of the anorthite and augite that I picked from West Rock may be added, and our knowledge of this diabase may be said to be quite complete as regards the composition of the fresh rock. I will place together the analyses of the rock and its other components. Professor Genth's analyses, to which I have referred, is more complete than any that I have made, since he determined the traces of lithia, copper, and sulphur. But his analysis was made on more hydrous material; therefore I will use my old analysis of West Rock, New Haven, because the analyzed material was very fresh, bright, and clear, and also illustrates the commonest variety of the rock.

This rock and the following minerals from it have been analyzed:

| | West Rock, New Haven.* | Augite in West Rock. | Anorthite in West Rock. |
|---|---|---|---|
| $SiO_2$ | 51.78 | 50.71 | 45.95 |
| $Al_2O_3$ | 12.79 | 8.55 | 34.70 |
| $Fe_2O_3$ | 3.59 | ........ | .64 |
| FeO | 8.25 | 15.30 | ....... |
| MnO | .44 | .81 | 15.82 |
| CaO | 10.70 | 13.85 | Tr. |
| MgO | 7.63 | 13.63 | 1.80 |
| $Na_2O$ | 2.14 | 1.48 | .45 |
| $K_2O$ | .39 | | |
| $TiO_2$ | 1.41 | ........ | ........ |
| $P_2O_5$ | .14 | ........ | ........ |
| Igniton | .63 | 1.17 | .96 |
| | 99.89 | 100.00 | 100.32 |

* My analysis with the titanic acid determinations by Dr. A. B. Howe, American Journal of Science, vol. ix, 1875, page 185.

Knowing that the feldspathic element is complex we can now calculate approximately the percentage composition upon the basis of the elements which are peculiar to the species involved. If in this manner neglecting the water we determine the percentage of the mineral constituents, we obtain

Anorthite, 15.52; albite, 22.16; potash feldspar, 2.32; augite, 54.47; titanic iron, 2.68; magnetite, 1.76; apatite, .32; total, 99.23.

The composition of this mixture, on adding again the water, would be as follows:

| | | | |
|---|---|---|---|
| $SiO_2$ | 51.78 | $Na_2O$ | 2.62 |
| $Al_2O_3$ | 12.46 | $K_2O$ | .39 |
| $Fe_2O_3$ | .92 | $TiO_2$ | 1.41 |
| FeO | 10.67 | $P_2O_5$ | .14 |
| MnO | .44 | $H_2O$ | .63 |
| CaO | 10.77 | | |
| MgO | 7.63 | | 99.86 |

This analysis differs from the one actually performed only in fractions of percentages in the alumina and soda, and I think may be assumed as being nearly correct. The amount of iron in the two analyses is identical, but there is some difference in the state of oxidation, which can readily be supposed to be the result of secondary actions that have taken place in the rock analyzed.

It becomes very easy now to see how extremely diversified the feldspathic element may be in rocks of this nature. The molecules may arrange themselves in very diversified ways, while the rocks remain identical in composition. Circumstances of cooling might cause anorthite to separate in a nearly pure condition, when there would be a compensating acidity in the remainder of the feldspathic element. This is a much more satisfactory explanation than that which I offered at the time I demonstrated the presence of anorthite in the West Rock diabase,[1] for as my analysis showed, the presence of the anorthite did not modify the ultimate composition of the rock. On the other hand pure anorthite might be entirely absent and its molecules might enter into combination with the molecules of the potassium and sodium feldspars, to form one or more intermediate species, as in the Jersey City diabase, and much diversity might exist in this feldspathic element in different localities without the slightest change taking place in the ultimate composition of the rock.

I regard this work as of some importance, since it completes our knowledge of the normal composition of a rock which has a great distribution and very uniform characters, and shows that this rock is more complex in composition than had been supposed. Besides it has been common to consider what feldspar enters into the composition of basic rocks like this, rather than what feldspars. An exquisite balance of composition and circumstance would be necessary to crystallize such a rock with a single feldspar, and we have reason to be convinced that massive rocks are rarely simple as regards their feldspathic constituent.[2]

It has also an important bearing upon the microscopic determination of feldspars by means of optical properties. The method proposed by Pumpelly, and further developed by Fouqué and Levy, is used for the determination of the species of feldspar by seeking for the greatest angles which elasticity planes make with twinning planes, in the zone with axis perpendicular to the twinning plane. There is of course a possible chance in a section that no crystals should be intersected in a plane possessing the approximate maximum angle between the traces of the twinning plane and elasticity plane, and there is also a possibility that one might examine many sections with approximately equal angles of extinction to the right and the left of the twinning plane, as the method requires, without meeting such as possess an angle characteristic of the species, even were such present; hence the correct determination of the species by this method must remain to a certain degree a matter of chance. But when the feldspathic element is complex, a determination based upon this method would lead one to determine the whole of the feldspar as belonging to the species with the maximum angle of extinction. This method has been applied to a very considerable extent, but the considerations here advanced show that the method, although entirely correct in principle, and certainly of some value in lithological research, is not adapted to the final determination of the exact nature of the feldspathic constituent, and is likely to lead to erroneous conclusions.

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[1] Am. Jour. Sci. 1875, vol. ix, p. 189. I concluded that a minute change in the composition of the rock would be sufficient to allow of the formation of anorthite, which on account of its infusibility would first crystallize from the rock mass, as was evidently the case.

[2] Fouqué has demonstrated the complexity of the feldspar in Santorin andesites, Santorin et ses Éruptions, page 366.

I have examined the basic rocks at Peekskill, on the Hudson, recently described by Professor Dana, American Journal of Science, vol. xx, page 194. The feldspathic element was easily separated into two parts, one of which was a pink variety of andesite and the other white orthoclase.

All are familiar with the grand diversity of the secondary products that occur in these rocks, and which have enriched the mineral cabinets of the whole world. The contact, modifications, and structural features are none the less interesting; but it is not the intention to consider these questions here. It will be well to record the observation that they are sometimes so modified by quick cooling upon the exterior walls of the dikes in contact with the sandstones that they become cryptocrystalline, and contain long acicular feldspar crystals in a glassy ground mass, and in other microstructures resemble augite andesites. The occurrence of glass has not been heretofore noticed in these rocks. Excepting such local modifications the rocks are always like the ordinary old diabases, and even in microscopic features monotonously alike wherever fresh stones occur.

These rocks so characteristic of our Triassic are additionally interesting on account of the comparative absence of eruptive material intruded in the similar Triassic sandstones of Europe.

NATIONAL MUSEUM, *Washington, D. C., April* 5, 1881.

## ON THE DETERMINATION OF FELDSPAR IN THIN SECTIONS OF ROCKS.

### By GEORGE W. HAWES, Ph. D.

In my recent article upon the composition of the diabases[*] which intersect the Mesozoic red sandstones upon the Atlantic border, I suggested that the complexity of the feldspathic element in basic rocks is probably much greater than is commonly supposed, and that this complexity is liable to cause a serious error if the method of determination by means of the measurement of the maximum angle between the twinning plane and the elasticity planes in thin sections cut in the zone with its axis perpendicular to the twinning is followed.

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[*] This volume, page 129.

I wish also by means of an analysis to draw attention to the circumstance, that the absence of a twinning plane parallel to the brachypinacoid is by no means rare, and this is a circumstance bearing upon the same point and demanding recognition in lithological work.

At the St. Paul Island, Labrador, from whence the beautiful *striated* labradorite specimens are obtained, there are also found large pieces of feldspar with beautiful broad basal cleavage planes, which show no trace of striation, and basal sections of which in polarized light under the microscope show no trace of twinned structure.

A piece of this feldspar in the cabinet of Professor Brush, at New Haven, is of a bluish-gray color, its basal cleavage is much more perfect than is usually the case with labradorite, and its cleavage parallel to the clinopinacoid is very much poorer than usual. It only shows in the latter direction a conchoidal vitreous fracture, with mere traces of cleavage. Its dark color is imparted to it by a multitude of minute black needles, the larger of which are inlaid parallel to the vertical axis of the crystal. The intersection of an elasticity plane and the base is inclined 5° to the edge between the basal and brachypinacoidal cleavages, while the intersection of the plane of the optic axes and the brachypinacoid is inclined 17° to the same edge, and both inclinations are in the directions characteristic of labradorite.

An analysis of this feldspar by Mr. F. W. Taylor, of the National Museum, yielded him the following result:

| | | | | |
|---|---|---|---|---|
| $SiO_2$ | 53.56 | ÷ 60. | .890 | 3. |
| $Al_2O_3$ | 27.78 | ÷ 103. | .269 | .93 |
| $Fe_2O_3$ | 1.15 | ÷ 160. | .007 | |
| CaO | 12.01 | ÷ 56. | .214 | |
| MgO | tr. | | | |
| $K_2O$ | 4.10 | ÷ 62. | .066 | |
| $Na_2O$ | 1.68 | ÷ 94.2 | .018 | 1. |
| | 100.28 | | | |

| $SiO_2$: | $R_2O_3$: | RO. | $R_2O$: | RO |
|---|---|---|---|---|
| 3 | 1 | 1 | 1 | 2.5 |

The angles and analysis therefore show that this is a typical labradorite, and as it forms at the St. Paul Island a component of a coarse-grained rock, it may be considered as a type of a triclinic feldspar, which could not be determined in a thin section by means of any method based upon the existence of twinning planes.

I would also call attention to some other cases.

The diorite from Dixville Notch in the White Mountains, described on page 96 of my report on the Lithology of New Hampshire,* contains large, clear, glassy crystals (microtine of Tschermak) of a feldspar simple in structure, my analysis of which proved it to be andesite. Some of the anorthosites described by Dr. T. Sterry Hunt in the Geology of Canada, 1863, were proven by his analysis to be composed of pure labradorite, and some sections of the same which he submitted to me for examination were found to be composed of a multitude of small grains, none of which were twinned. Some of the fine crystals of oligoclase from Bodenmais are simple crystals so far as the ordinary mode of twinning is concerned.

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* Geology of New Hampshire, by Prof. C. H. Hitchcock, vol. III.

If feldspar habitually showed their cleavages in their sections? the optical method might still be followed with some certainty, but as they do not, when the grains are too small to allow cleavage fragments to be obtained for optical examination, the method followed by me* in the examination of the feldspathic constituent of the Triassic diabase is the most reliable.

In consideration both of the complexity of the feldspathic element in most rocks, and of the possibility of the simplicity of structure in triclinic feldspars, the very carefully developed methods founded upon the relation of twinning planes and elasticity planes in chance sections are liable to lead to wrong results.

NATIONAL MUSEUM, *April* 20, 1881.

## ON CERTAIN CRETACEOUS FOSSILS FROM ARKANSAS AND COLORADO.

### By C. A. WHITE.

In volume III of the Proceedings of the United States National Museum, pp. 157–162, five species of Cretaceous fossils (together with some Tertiary species) were described, but not then illustrated. Illustrations of those Cretaceous species are now given on the accompanying plate of this volume, together with those of two other Cretaceous forms which are for the first time described in this article.

The Arkansan species were collected by Mr. E. O. Ulrich in the vicinity of Little Rock, and by him presented to the Museum, together with a parcel of other fossils, mainly mollusca, which he found associated with them. The greater part of these Arkansan specimens are in the condition of mere casts of the interior of the shells, and therefore the determination of their specific and generic relations is not entirely satisfactory in all cases.

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*This volume, page —. The method of separating constituents of rocks by means of a heavy solution was first proposed, according to von Lasaulx, by Fleuvian de Bellevue and Cordier, at the beginning of this century. Church suggested the use of the solution of the iodide of potassium in iodide of mercury, in the Mineralogical Magazine in November, 1877.

Thoulet bettered the method and introduced improved apparatus. (Bulletin de la Soc. Minéral. de France, 1879, No. 1.) Victor Goldschmidt succeeded in increasing the special gravity of the fluid to 3.2. (Inaugural Dissertation, Stuttgart, 1880.)

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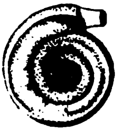

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# EXPLANATION OF PLATES.

FIG. 1. Cantharus? julesburgensis; lateral view.
" 2. " " apertural view.
" 3. Lucina cleburni; right-side view.
" 4. " " dorsal view.
" 5. Lucina profunda; right valve.
" 6. " " left valve.
" 7. Pteria (Oxytoma) erecta; right valve.
" 8. " " " left valve.
" 9. Solemya bilix; right valve.
" 10. Callianassa ulrichi; left manus; exterior view.
" 11. " " " interior view.
" 12. Tubulostium dickhauti; lateral view.
" 13. " " peripheral view.

All of natural size.

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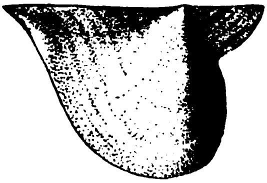

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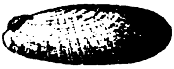

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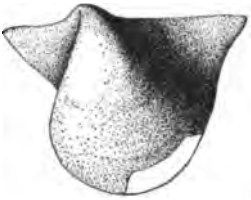

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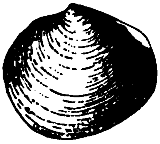

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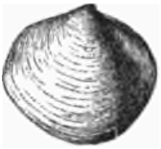

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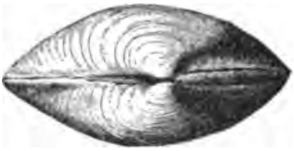

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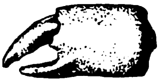

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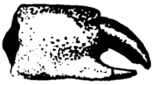

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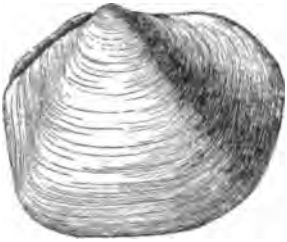

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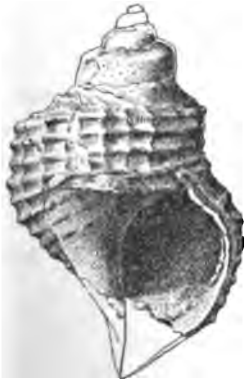

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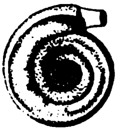

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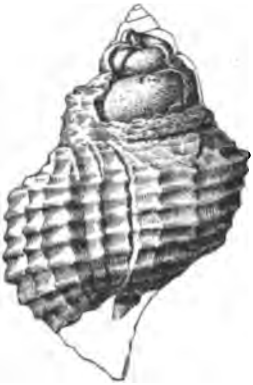

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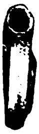

The following is a list of them so far as their specific and generic identity could be determined:

*Callianassa ulrichi* White.
*Tubulostium dickhauti* White.
*Nautilus texanus* Shumard.
*Turritella*? ——— apparently two species.
*Anchura* ———?
*Lunatia* ———?
*Corbula*? ———?
*Cytherea* ———?
*Crassatella*? ———?
*Axinæa* ———?
*Cucullæa* ———?
*Idonearca* ———?
*Modiola* ———?
*Ostrea* ———?
*Gryphæa pitcheri* Morton?
Spines of an Echinoid.

The two species described in this article as new were collected by Mr. Cleburn in the valley of South Platte River, a few miles from Julesburg, Colo. He found associated with these two species several other molluscan forms, all of which are characteristic of the later Cretaceous strata, equivalent with those of the Upper Missouri River region, which are generally known as the Fox Hills and Fort Pierre Groups. The following is a list of the species collected by Mr. Cleburn, so far as they are determinable:

*Nautilus dekayi* Morton.
*Placenticeras placenta* Dekay.
*Scaphites conradi* Morton.
*Turris* (*Serula*) *contortus* Meek & Hayden.
*Cantharus*? *julesburgensis* (sp. nov.).
*Pyropsis bairdi* Meek & Hayden.
*Fasciolaria* (*Piestocheilus*) *culbertsoni* Meek & Hayden.
*Pyrifusus subturritus* Meek & Hayden.
*Anchura americana* Meek & Hayden.
*Lucina cleburni* (sp. nov.).
*Solemya bilix* White.
*Inoceramus barabini* Morton.

Following are descriptions of the two new species before referred to, and also references to the other five Cretaceous species which were described in volume III, all of which are illustrated on the accompanying plate in this volume.

### CALLIANASSA ULRICHI White.

(Plate —, Figs. 10 and 11.)

*Callianassa ulrichi*, White 1880, Proc. U. S. National Museum, vol. iii, p. 161.

### TUBULOSTIUM DICKHAUTI White.

(Plate —, Figs. 12 and 13.)

*Spirorbis? dickhauti* White, 1880, Proc. U. S. National Museum, vol. iii, p. 161.

Since the description of this species was published (loc. cit.), certain fragments have been brought to light which indicate that this shell really belongs to a group for which Dr. Stoliczka in Pal. Indica, vol. ii, p. 237, proposed the generic name *Tubulostium*. Our species is indeed very closely related to his *T. discoideum* (op. cit., pl. xviii, figs. 20–25). The tubular prolongation of the mouth is one of the distinguishing features of this group of shells. Our specimens do not show this feature clearly, but it is probable that that portion of the shell has been broken off, as is suggested by the added outline in figure 12.

### CANTHARUS? JULESBURGENSIS (sp. nov.).

(Plate —, Figs. 1 and 2.)

Shell short fusiform; spire moderately elevated; volutions convex, apparently five or six in number, obscurely flattened upon the outer side and obliquely flattened or slightly concave upon the distal side; the outer side of the volutions marked by four strongly-raised revolving ribs (including the two prominent ones which border the flattened portion of the outer side) which are narrower than the spaces between them; the distal side marked by two or three similar, but less distinct revolving ribs, the convex proximal side of the last volution marked by numerous ribs similar to those of the outer side, but which decrease in prominence anteriorly after the first two; longitudinal varices irregular, somewhat numerous, giving the shell, in connection with the revolving ribs, a rugose aspect.

Length about 50 millimeters; diameter of the last volution 22 millimeters. (Museum No. 11468.)

Only a single example of this species has been discovered, and that is imperfect, as shown in the figure. Its characteristics are, however, so well marked that it may be readily recognized as distinct from any hitherto-described form.

*Position and locality.*—Later Cretaceous strata (equivalent with the Fox Hills and Fort Pierre Groups of the Upper Missouri River region) in the vicinity of Julesburg, Colo., where it was obtained by Mr. W. Cleburn.

### LUCINA PROFUNDA White.

(Plate —, Figs. 5 and 6.)

*Lucina profunda* White, 1880, Proc. U. S. National Museum, vol. iii, p. 158.

### LUCINA CLEBURNI (sp. nov.).

(Plate —, Figs. 3 and 4.)

Shell moderately large, indistinctly pentahedral in marginal outline; valves moderately convex; posterior side truncate, basal border rather short, nearly straight or slightly convex, abruptly rounded up to the posterior border and broadly rounded up to the antero-basal border; front prominent, somewhat abruptly rounded above; antero-dorsal border slightly concave, nearly horizontal; postero-dorsal border slightly convex, sloping downward and backward, its whole length occupied by a large prominent external ligament; lunule very narrow, hardly so wide as the ligament, and extending the whole length of the antero-dorsal border; beaks small, situated subcentrally; umbonal ridge not well defined, passing near the posterior and postero-dorsal borders. Surface marked by the usual distinct lines of growth, and also by somewhat numerous strongly and sharply raised concentric lines, especially upon its upper and umbonal portions.

Length 37 millimeters; height 30 millimeters; thickness, both valves together, 14 millimeters. (Museum No. 11469.)

This fine shell bears some resemblance to the preceding, but it is a more robust form, its transverse diameter is proportionally greater, the front more prominent, the basal border less abruptly rounded, and the external ligament larger and more prominent. In its large size it resembles *L. occidentalis* Morton, as identified by Meek and figured in vol. ix, U. S. Geol. Sur. Terr., but in its abrupt posterior truncation and greater prominence of the upper portion of the front it differs conspicuously from that species.

The ligament of this shell is unusually large and prominent for that of a *Lucina*, but it has the outward characteristics of a species of that genus. Besides this, an imperfect separate valve, too fragile for preservation, which was found associated with the other specimens, and which apparently belongs to the same species, shows the hinge, pallial line, and muscular markings which characterize *Lucina*.

*Position and locality.*—Later Cretaceous strata (equivalent with the Fox Hills and Fort Pierre Groups of the Upper Missouri River region) in the vicinity of Julesburg, Colo., where it was obtained by Mr. W. W. Cleburn, and in whose honor the specific name is given.

### SOLEMYA BILIX White.

(Plate —, Fig. 9.)

*Solemya bilix* White, 1880, Proc. U. S. National Museum, vol. iii, p. 158.

This species was also found by Mr. Celeburn, near Julesburg, Colorado.

### PTERIA (OXYTOMA) ERECTA White.

(Plate —, Figs. 7 and 8.)

*Pteria* (*Oxytoma*) *erecta* White, 1880, Proc. U. S. National Museum, vol. iii, p. 157.

## DESCRIPTION OF A NEW SPECIES OF GOBIESOX (GOBIESOX RHESSODON) FROM SAN DIEGO, CALIFORNIA.

By ROSA SMITH.

Allied to *Gobiesox reticulatus* Girard.

Form essentially like that of *G. reticulatus*, and, as in that species, the snout bluntly and evenly curved. The greatest height of the body is across the pectoral fins, and the width is also greatest between those fins. Head broader than body but less deep. Cleft of the mouth extending to the anterior rim of the orbit. Lips thickish as in *G. reticulatus*. The anterior incisors of the lower jaw are less declined than those of *G. reticulatus*, nearer vertical than horizontal, each of them tricuspid at tip, the central cusp largest; about eight incisors on the mandible. Teeth of the upper jaw conical, in an irregular series of seven to nine, the alternate four or five being larger than the other three. Gill-membranes free from the isthmus. Opercular spine sharp.

Sucking disk entirely similar in form and structure to the other species, its tips extending nearly as far as do the free tips of the pectorals.

The distance from vent to base of the caudal fin is contained in the distance from vent to tip of snout slightly more than one and a half times (2¼ in *G. reticulatus*).

Length of head contained two and three-fourth times in total length to base of caudal as in *G. reticulatus;* the tail proportionally longer than in *G. reticulatus*, although the vertical fins have fewer rays; in both the dorsal fin is a little longer than the anal, having its origin in advance of the anal and terminating opposite it. The caudal fin is rounded and of a yellowish-white color, generally with few punctulations and these at its base. Dorsal rays 11; anal 10.

Slate color rarely nearly plain, usually with rather broad, distinct, slightly mottled with paler yellowish bands across the dorsal region; the first a distinct band through the eyes, the second much broader and situated at the posterior margin of pectorals; a roundish spot of same color may be seen on each side at the base of the dorsal fin; these spots, when viewed from above, form a third light band, its distance from the second band equalling that between the orbital band and the second or central one. A dark bar at base of caudal. Underneath yellowish, with dark punctulations on the lower jaw and the belly, fine punctulations on the light bands, on dorsal and pectoral fins and base of caudal.

This species is known to me by about fifty examples collected by Mr. Mr. Charles R. Orcutt, and found adhering to stones in company with *Typhlogobius californiensis* * at Point Loma. It differs from *G. recticula-*

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* *Typhlogobius californiensis* Steindachner, Ichthyol. Beiträge VIII, Sitzgber. Wien. Akad. 1879, 142 = *Othonops eos m.* Proc. U. S. Nat. Mus. 1881, 19.

*tus* in the fewer rays in dorsal and anal and in the tricuspid teeth. The usual color is also different.

The type specimens have been presented to the National Museum, and they are numbered 28,396 on the Museum Register. The largest measured 1¾ inches.

*Table of Measurements.*

Locality.................................................................San Diego, Cal.

| Dimensions. | *G. rhessodon.* | | *G. reticulatus.* | |
|---|---|---|---|---|
| | Inches and 100ths. | 100ths of length. | Inches and 100ths. | 100ths of length. |
| Extreme length | 1.40 | .......... | 2.50 | .......... |
| Length to base of caudal fin | 1.20 | .......... | 2.05 | .......... |
| Body: | | | | |
| Greatest height | .......... | 20 | .......... | 19 |
| Greatest width | .......... | 27 | .......... | 25 |
| Least height of tail | .......... | 8 | .......... | 9 |
| Length of caudal peduncle | .......... | 9 | .......... | 4 |
| Head: | | | | |
| Greatest length | .......... | 37 | .......... | 38 |
| Greatest width | .......... | 33 | .......... | 32 |
| Width of interorbital area | .......... | 18 | .......... | 15 |
| Length of snout | .......... | 11 | .......... | 12 |
| Diameter of orbit | .......... | 8 | .......... | 6 |
| Dorsal: | | | | |
| Distance from snout | .......... | 65 | .......... | 66 |
| Length of base | .......... | 33 | .......... | 35 |
| Anal: | | | | |
| Distance from snout | .......... | 68 | .......... | 70 |
| Length of base | .......... | 26 | .......... | 28 |
| Caudal: | | | | |
| Length of middle rays | .......... | 18 | .......... | 22.5 |
| Pectoral: | | | | |
| Distance from snout | .......... | 38 | .......... | 39 |
| Length | .......... | 14 | .......... | 13 |
| Anterior margin of ventral disk: | | | | |
| Distance from snout | .......... | 30 | .......... | 18 |
| Length | .......... | 29 | .......... | 34.5 |
| Dorsal | 11 | .......... | 13 | .......... |
| Anal | 10 | .......... | 13 | .......... |

SAN DIEGO, CAL., *January* 15, 1881.

## DESCRIPTION OF A NEW GENUS AND SPECIES OF COTTIDÆ.

### By W. N. LOCKINGTON.

**Chitonotus** gen. nov.

Allied to *Artedius* Girard.

Anal papilla of males excessively developed, and terminating in a narrower crescentic portion, from which springs a long tubular filament. First dorsal incompletely divided into two portions, the anterior the shorter. Lateral line armed with a series of keeled scales, toothed on keel and on hinder margin. Entire upper portion of body, save a narrow area along the base of the dorsal fin, covered with small strongly ctenoid scales. Other characters as in *Artedius*. Type *Chitonotus megacephalus* Lockington.

This genus is instituted for the reception of *Artedius pugettensis* Steindachner (Ichthyol. Beiträge V. 133) and of the species here described.

**Chitonotus megacephalus.**

D. III, VII | 15–16. A. 15–16. C. 9 | 11 | 9. P. 18. V. I | 3.

Body deepest under origin of first dorsal, thence decreasing regularly to the caudal peduncle, which at its narrowest part is about two-sevenths of the greatest depth. Hinder part of head almost quadrangular in section, compressed, the compression increasing from the eyes forward.

Head $3\frac{8}{13}$–$3\frac{11}{16}$; greatest depth $6\frac{1}{6}$ times in total length. Greatest width at gill-covers slightly less than greatest depth.

Eyes large, oval, about $3\frac{1}{4}$ times in length of side of head, their longitudinal diameter exceeding the length of the snout by about five-twelfths; the hinder margin of the orbit rather nearer the tip of the operculum than that of the snout, and the interorbital space very narrow, so that the eyes are directed obliquely upwards.

Upper jaw slightly longer than the lower, which is received within it; posterior extremity of maxillary slightly in front of or beneath the posterior orbital margin. Teeth in both jaws villiform, sharp, uniform, in a long but not wide band. Intermaxillaries protractile downwards. Snout convex longitudinally and transversely.

Nostrils with membranous tubes; the anterior lateral, in a line between the centre of the eye and the tip of the upper jaw; the posterior in a concavity between the extremities of the ascending processes of the premaxillaries and the raised anterior upper orbital margin. Nasal tentacles long but narrow, situated above the anterior nostril and just in front of the sharp, backward-directed nasal spine. Eye tentacles similar to nasal tentacle.

Four preopercular spines; the upper longest, with 2–4 prongs on its upper side besides the tip; second horizontal; third directed downwards; lowest directed downwards and forwards.

Operculum unarmed, its membranous tip vertical with the first ray of the second half of the first dorsal. An inner and outer pair of spines behind each eye on top of head, outer spines the larger. Posterior to these spines a short ridge, ending in a backward-directed spine on back of head. Area between these spines somewhat concave transversely. Suborbital ring and stay narrow.

Origin of first dorsal over the commencement of the free horizontal upper border of the operculum. *First ray nearly equal in height to the length of the head*, second about two-thirds as long, third shorter than fourth, *and separated from it by an interspace twice as long as the others*, the membrane between these rays also deeply notched. Fifth and sixth rays longer than the fourth or than the following rays, which gradually diminish, giving the upper margin of the second part of the spinous dorsal a rounded outline. Central rays of second dorsal about half as long as the head. Anal similar to second dorsal.

Pectoral fanlike, its base very oblique, parallel with the hinder margin of the operculum, its longest rays about equal to four-fifths of the head and reaching backwards to the second anal ray. Lower rays very short.

Middle ray of ventral rather longer than the first, considerably longer than the third, and reaching to the base of the anal papilla. All the rays of the preceding fins simple.

Caudal nearly straight on its posterior border, the two outer principal rays simple, the remaining nine once bifurcate. Accessory rays numerous.

Upper part of head and body covered with strongly ctenoid scales, except a narrow line along each side of dorsal. The scales of lateral line (about 39) more than twice as long and deep as those above them, ctenoid on hinder margin, and with a toothed keel near their upper margin. Lower portion of body scaleless.

Gill-openings continuous; the membrane emarginate, not attached to the isthmus. Branchiostegals six.

Males with a long anal papilla, ending in a crescentic stiff, tapering portion, from the upper side of which, near its tip, springs a long tubular filament.

Color of upper part of body reddish brown or gray, with obscure darker transverse bands. Fins dark olivaceous in recent examples, darkest toward the margins, the pectorals near base and the sides of the head greenish, thickly dotted with black. In some the dorsal and anal are lighter.

I have only seen adult males.

This species was first found in the markets of San Francisco in the summer of 1879, and was noticed by me in a paper published in the Mining and Scientific Press of that city,  1879, in the following terms: "Some months ago I wrote for publication a description of a small sculpin which I named *Chitonotus megacephalus*, the large-headed mailed-back. * * * I find that Dr. Steindachner has got ahead of me, and has described the same fish from specimens obtained in Puget Sound. He also gives a figure. From this figure I judge that the form and proportions of the dorsal fin vary considerably. In my specimens the first spine is exceedingly long, the third quite short, shorter than the fourth, and as these spines are twice as distant from each other as are any of the others, and the membrane between them dips down almost to its base, the fin is practically divided in two. Dr. Steindachner's figure shows only a slight emargination of the fin, the first spine only slightly longer than the others, and the spines equidistant."

Professor Jordan, who has handled numerous examples from Puget Sound, informs me that they agree in every respect with the figure given by Steindachner, and that he has no doubt of the distinctness of the Californian type. In his description Dr. Steindachner mentions the division of the dorsal in terms that lead me to suspect that he possessed both types.

The name *megacephalus*, since it has been published along with a diagnosis of its leading points of difference from *C. pugettensis*, must, I presume, be retained, instead of a more expressive term which might be drawn from the form of the dorsal fins.

*C. megacephalus* is tolerably abundant in moderately deep water outside the Bay of San Francisco. Specimens numbered 27185 are in the National Museum.

## DESCRIPTIONS OF NEW FISHES FROM ALASKA AND SIBERIA.

### BY TARLETON H. BEAN.

Most of the species here described were obtained for the United States National Museum during the summer of 1880, through the assistance of the United States Coast Survey schooner Yukon, whose party the writer was permitted to accompany for the purpose of making collections, more particularly of fishes and fishery statistics, in Alaska. It would have been difficult, if not impossible, to secure so valuable a collection of the fishes in any other way, the Yukon having called at numerous ports along the major portion of the Alaskan coast as well as at Plover Bay, Siberia, where several species not elsewhere found were taken. The whole number of species taken is above 80, and it is due to the Superintendent of the United States Coast Survey and to Mr. W. H Dall to say that their generous help has made this result possible.

In this article, which is simply preliminary to a detailed account, short notices only are given of fishes which are to be more fully described hereafter.

**Lycodes coccineus n. s.**

Museum Catalogue number 27748; collector's number (1712).

Big Diomede Island, September 10, 1880.

Br. VI; D. including half of caudal 87; A. including half of caudal 69; P. 18; V. 3. Posterior two-thirds of tail covered with scales which are not in contact. Fins and all parts of the body and head scaleless.

The total length of the typical specimen in its fresh state was 19.7 inches (484 millimeters). In its present state of preservation it has shrunk to 475 millimeters.

The species resembles *L. mucosus* Rich., but may be readily distinguished by its more extensive squamation, shorter and deeper head, stouter tail, more advanced position of ventrals and vent, and by its coloration; *L. mucosus*, too, has a lateral line consisting of rounded open pores, while *L. coccineus* has simply a few faint, short linear scratches which are almost imperceptible to the eye. These traces are seen only on that portion of the skin which has scales.

The greatest height of the body is a little less than half the length of the head, which constitutes nearly one-fourth of the total length. The pectoral is twice as long as the intermaxillary and terminates at a distance from the vent equal to its own length. The distance of the ventrals from the tip of the snout equals one-fifth of the total length. The dorsal begins over the anterior half of the pectoral; the anal, under the twenty-first dorsal ray. The length of the palatine series of teeth equals half that of the maxilla. The tail is much stouter than in *L. mucosus*, resembling that of the species known in this Museum as *L. Vahlii.*

COLORS (taken from the fresh fish): The colors are somewhat faded. Ground-color brown, with red on the lower parts. Pectorals reddish-brown on the upper half, the lower part carmine; mottlings of whitish at base. Nine bluish-white bands on the dorsal. A few irregular blotches of the same color on the sides. Anal brown mingled with carmine; lips similar. The brown of the body is more or less tinged with carmine everywhere. Under side of head white. The top of the head and the gill-covers have a few small blotches of whitish. A whitish blotch about as long as the eye at the upper angle of the gill-opening.

*Measurements.*

(Taken from the fresh specimen.)

| Current number of specimen | 27748 | |
|---|---|---|
| Locality | Great Diomede,<br>Sept. 10, 1880. | |
| | Millimeters. | 100ths of length. |
| Extreme length | 484 | ........ |
| Body: | | |
| Greatest height | 64 | 13 |
| Greatest width | 49 | 10 |
| Height at ventrals | 51 | 10½ |
| Head: | | |
| Greatest length | 114 | 23½ |
| Greatest length to upper gill opening | 110 | 23 |
| Distance from snout to nape | 84 | 17½ |
| Greatest width | 73 | 15 |
| Width of interorbital area | 28 | 6 |
| Width of interorbital area on bone | 7 | 1½ |
| Length of snout | 34 | 7 |
| Length of palatine series of teeth | 29 | 6 |
| Length of maxillary | 60 | 12½ |
| Length of intermaxillary | 31 | 6½ |
| Length of mandible | 63 | 14 |
| Distance from snout to orbit | 39 | 8 |
| Diameter of eye | 11 | 2½ |
| Dorsal: | | |
| Distance from snout | 143 | 30 |
| Length of base | 331 | 70 |
| Length of longest ray | 33 | 7 |
| Anal: | | |
| Distance from snout | 265 | 52 |
| Length of base | 230 | 47½ |
| Longest ray | 27 | 5½ |
| Distance of vent from snout | 240 | 50 |
| Pectoral: | | |
| Distance from snout | 124 | 25½ |
| Length | 63 | 13 |
| Ventral: | | |
| Distance from snout | 96 | 20 |
| Length | 11 | 2½ |
| Branchiostegals | VI | ........ |
| Dorsal | 87 | ........ |
| Anal | 69 | ........ |
| Pectoral | 18 | ........ |
| Ventral | 3 | ........ |

**Stichæus ? Rothrocki, n. s.**

Seventeen small individuals of the family *Stichæidæ* were obtained in Plover Bay and at Cape Lisburne, the largest of them being only 36 millimeters long. The lateral lines are undeveloped, so that I cannot with certainty decide whether my species is a *Stichæus* or a *Eumesogrammus*, but the resemblance to *Stichæus punctatus* appears to me sufficiently great to warrant me in referring it to the same genus.

Catalogue numbers of the types: 27565, Head of Plover Bay, Siberia; 27580, Port Providence, Plover Bay; 27573, Cape Lisburne, Alaska, Arctic Ocean.

Br. VI; D. 48–49; A. I, 34–35; V. I, 4; P. 15; C. 21.

The height of the body equals the length of the head without the snout, and is contained 6 times in the total length without caudal. The length of the head is contained 4½ times in total without caudal. Snout subconical, equal to eye, which is ¼ as long as the head. Distance between the eyes equals length of snout. The maxilla reaches the vertical through the anterior margin of the pupil. The nostrils are midway between the eye and the end of the snout. The dorsal begins in the vertical through the upper axil of the pectoral, and is connected by a low membrane with the caudal. The anal begins under the 14th dorsal spine, and, like the dorsal, is subcontinuous with the caudal. The pectoral is comparatively short and broad, its length being equal to the height of the body, and to that of the head without the snout. Ventrals short, only ⅓ as long as the head and less than half as long as the pectorals; they are placed very close together. The distance of the vent from the snout is contained nearly 3 times in the total length with the caudal. The longest dorsal spines are equal to half the height of the body. The longest anal rays are about ⅔ as long as the longest spines of the dorsal. *The expanded caudal is slightly emarginate*, in which the species differs from *S. punctatus* and *Eumesogrammus subbifurcatus*. Teeth in the jaws and apparently on the vomer and palatine bones. Branchiostegal membrane deeply cleft, free from the isthmus.

*Colors.*—Body very light brown, intermingled with numerous light spots in three series (supra-lateral, median, and infra-lateral), those of the median series in some individuals being longer and narrower than those of the other two series. The largest light spots of the supra-lateral series are about ⅔ as large as the eye. On the top of the back, traversed by the basis of the dorsal fin, is a series of 10 or 11 whitish spots, the anterior ones being about as large as the eye. A dark stripe around the nose, and continued behind the eye to the end of the operculum. A very narrow dark stripe running along the base of the dorsal, its lower margin seeming to mark the course of the superior lateral line. In some individuals the origin of each anal ray is marked by a minute dark point. Body covered with minute scales.

If, as I suspect, the developed form of the species shows but one lateral line running along the whole length of the dorsal and not far removed from it, this character, combined with the emarginate caudal, will entitle the species to rank as the representative of a distinct genus for which the name *Notogrammus* is here proposed.

The species is dedicated to my preceptor in zoölogy and medicine, Dr. J. T. Rothrock, of West Chester, Pennsylvania.

**Muræenoides maxillaris**, n. (?) s.

? *Murænoides fasciatus*, (Bl. Schn.)

Catalogue number of the single type specimen 23999, collected in 1872 by Mr. Henry W. Elliott, at Saint Paul Island, Bering Sea.

Br. vi—v; D. 88; A. ii, 43; V. ?, 1.

This species, as well as *M. ornatus* Girard, may be at once separated from *M. nebulosus* Schleg. by its scaleless head.

When the mouth is closed the cleft is very little oblique and the tip of the lower jaw is in a horizontal through the middle of the eye; the width of the mouth across the tips of the maxillæ equals the length of the pectoral and almost one-half the length of the head. The length of the maxilla equals one-half the distance from the end of the snout to the beginning of the dorsal. The mandible is as long as the pectoral.

The greatest height of the body slightly exceeds the length of the head and equals one-seventh of the total length without the caudal; it equals, also, one-fourth of the distance from the end of the snout to the beginning of the anal. The length of the head is contained 8½ times in the total length. The width of the interorbital space is a little less than the diameter of the eye, which equals the length of the snout. The length of the pectoral equals one-half the height of the body at the origin of the anal; the greatest width of the fully expanded fin is nearly equal to the length. The ventral spine is two-thirds as long as the eye.

The greatest height of the dorsal is not far from the origin of the fin, and equals one half the length of the mandible. The length of the caudal equals one-half the length of the head. The vent is not far behind the middle of the total length, and is directly under the 43d dorsal spine.

Colors from the alcoholic specimen: A brown band occupies the whole interocular space, and is preceded and followed by a whitish band only one-half as wide. Immediately below the eye a brown band, whose width equals one-half the length of the eye, extends down to the throat; a whitish band a little wider than the brown one is immediately behind it. It seems as if the fresh fish may have on this part of the head two whitish bands with a brown one between them. Back with a series of 11 rounded or oblong light spots, the longest of which is one-half as long as the head; all of these spots include at the top a rather large brown spot and below numerous little brown spots. Between the first and second large light blotches are two very dark spots on the dorsal membrane, and between the dark spots there is a light one of similar size. On the sides are about 26 light bands, most of them very distinctly defined, especially between the gill-opening and the vent. Behind the vent the bands are not so well marked, and a few small light spots are in the intervals between them. The ground color of the fish is brown. The longest light bands are about as long as the head.

I have not seen *M. fasciatus*, and know it only from the descriptions and figures. These seem to indicate a species with the maxilla only one-third as long as the space between the tip of the snout and the beginning of the dorsal, with the ventrals little developed and with the head less than one-tenth of the total length. *M. maxillaris* has a much longer maxilla, a wider mouth (measured over the tips of the maxillæ with the mouth closed), well developed and separate ventrals, and the head nearly one-eighth of the total length.

**Liparis gibbus**, n. s.

This is a species resembling *L. fabricii* Kröyer and *L. tunicata* Rhdt. in its dorsal and anal ray-formulæ; but it shows important differences from both.

From *L. fabricii* it may be at once distinguished by its smaller eye (one-fourth as long as the head) and its depressed snout (the distance from the angle of the mouth to the base of the anterior nostril being less than one-half the greatest depth of the head). It differs from *L. tunicata* in having (1) a larger eye, (2) a much smaller number of pectoral rays, (3) a much smaller number of unarticulated dorsal and anal rays.

In preparing the description, I have made use of the following specimens:

24010 (1203), Unalashka, W. H. Dall (1 specimen).

24047, Saint Paul Island, 1872, H. W. Elliott (1 specimen).

26625 (1654), off Cape Tchaplin, Siberia, 1880, Dall & Bean (1 specimen).

27535 (1722), Plover Bay, Siberia, 1880, Dall & Bean (1 specimen).

27545 (1638) Plover Bay, 1880, Dall & Bean (2 specimens).

Of these number, 24047 is in the best state of preservation, the lax integument being largely or partly separated from the body in most of the other individuals. I have examined number 27535 most closely to learn the structure of the fins, and find that it has 44 dorsal rays, of which only the first 12 are not articulated; the anal has 36 rays, only the first one being unarticulated; the pectoral has 35 rays, and the caudal 12. The radial formulæ of the other examples are as follows:

24010, D. 38+; A. 29+.

24047, D. 42; A. ca. 32.

26625, D. 41; A. ca. 33.

27545*a*, D. 42; A. 35.

27545*b*, D. 42; A. ca. 34.

The dorsal and anal are connate with the caudal, the free portion of the caudal being only about one-third as long as the head. The greatest width of the head is nearly equal to its greatest length and exceeds its greatest depth. The interocular region is shallow concave, and the vertex and nape are somewhat elevated. The snout is obtuse and moderately depressed. The body is rather abrubtly compressed at the vent, where its thickness equals only one-third of the length of the head. The anterior dorsal rays are regularly graduated, and much shorter than the rays in the middle of the fin. The longest dorsal ray is one-half as long as the head. The length of the eye is contained 4 times in that of the head, which equals one-fourth of the total length with caudal. The length of the snout equals one-third of that of the head. The nostrils are tubular, the anterior pair having much the longer tubes, their distance from each other equaling the length of the eye. The maxilla extends to below the anterior margin of the pupil. Dentition as in *L. fabricii*. The ventral disk is nearly circular, its length contained 8 to 8½ times in the total length. The distance of the dorsal from the snout equals nearly one-third of the total length without the caudal. The length of the caudal equals about one-seventh of the total length. The greatest height of the body equals the length of the head. The pectoral extends to the origin of the anal.

Colors of specimen 26625 taken from the living fish.

(Dredged off Indian Point (Cape Tchaplin), E. Siberia, Behring Strait, August 15, 1880.)

Upper parts gray, punctulated with brown; on the top of the snout and on head and back, as far as beginning of dorsal, two concentric stripes or elongated rings of brown inclosing gray areas; similar stripes along side of head, and extending back to near middle of body; also on posterior part of body; between these long stripes are two irregular rings of brown inclosing gray; a brown stripe along lower part of head and body, blending into a wider area of brown of the lower parts; belly yellow on the sides, and punctulated with brown; iris brown, mingled with a little vermilion; pupil has a yellow margin; fins brown and punctulated; a dark band at caudal base; snout whitish on top.

A more common pattern of coloration is the following:

Head and body very light brown or gray intermingled with brown; belly and under surface of head lighter; dorsal and anal with some irregular dark markings simulating bands; caudal with three dark bands; sometimes the posterior half of the body is mottled with dark blotches.

**Cottus humilis**, n. s.

Museum number 27972; collector's number (1700). Chamisso Island, Eschscholtz Bay, August 31, 1880.

D. X, 16; A. 13, V. I, 3; P. 18; Br. VI.

Head broad, subtriangular, much depressed, contained 2⅔ times in total length, caudal included. Greatest depth of head contained 2⅔ times in its greatest length. Eye equal to interocular space, contained twice in length of snout and 4 times in postorbital portion of head to end of opercular flap. Whole upper surface of head covered with small skinny tubercles. Vomerine patch of teeth very large.

Two strong spines above the snout, an obtuse prominence above each orbit and a pair on the occiput. In large individuals there is a tendency towards division and enlargement of the prominences and their extension, so as to form imperfect keels on the vertex. Behind the supraorbital prominences are several radiating sharp ridges similar to those of *C. polyacanthocephalus.* Interocular space concave. There is also a depression on the vertex, becoming narrower posteriorly. Three preopercular spines, the uppermost being longest and equal to the eye in length. The longest dorsal spine (fourth) is half as long as postorbital part of head, or slightly more. The length of the maxillary bone is contained 2½ times in the length of the head. End of maxilla reaches slightly past hind margin of eye. The ventrals when extended straight backwards are equal to their distance from the beginning of the anal. The pectorals reach the vertical from the beginning of the soft dorsal. Skin above the lateral line with a single series of rough bony tubercles which are finely toothed and sometimes depressed in the centre. A few similar but smaller spiny tubercles below the lateral line.

The dorsals are separated by a short interspace. The spinous dorsal begins in a line with the upper axil of the pectoral. The longest ray of the second dorsal is contained 4 times in the distance from the tip of the snout to the beginning of the second dorsal. Tail little rounded, contained 5½ times in total length without caudal.

Colors of the alcoholic specimen: Purplish brown above, whitish below. First dorsal has two broad, oblique dark bands separated by a light area. Second dorsal has about 5 dark bands, anal about 6. The pectorals have about 4 interrupted bands; the caudal has 3. Ventrals whitish, faintly tinged in two areas with dark color. Sides with a few white blotches; a larger individual has, also, some small white blotches on the belly.

Length of type 240 millimeters (9½ inches).

| | Inches. |
|---|---|
| Length of head | 3.4 |
| Length of snout | .8 |
| Greatest height of body | 1.5 |
| Least height of tail | .4 |
| Greatest width of body | 1.6 |
| Width of interocular space | .5 |
| Long diameter of eye | .5 |
| Length of fourth dorsal spine | .9 |
| Length of fifth dorsal ray | 1.2 |
| Length of sixth anal ray | .9 |
| Length of pectoral | 1.9 |
| Length of ventral | 1.3 |
| Length of caudal | 1.4 |
| Length of maxilla | 1.4 |

**Cottus niger**, n. s.

Museum numbers 23929, 27952, and 27971. Collector's numbers (1621), (1622), (1623), (1624), (1625).

St. Paul Island, Bering Sea, 1872 (H. W. Elliott), and August 6, 1880 (Dall & Bean, from Mr. Armstrong).

Br. VI; D. IX, 15–17; A. 11–13; V. i, 3; P. 16–17.

Two very blunt prominences above the snout entirely enveloped in the skin in a specimen 10 inches long. No spines above the orbits or on the occiput. The spines at the upper angle of the preopercle are the only ones that are not covered up in the skin, and these are almost hidden. The two uppermost preopercular spines are the only sharp ones present. Top of head covered with fine skinny granulations and the vertex with numerous slender tentacles. The place of the supraorbital spine is occupied by a soft tentacle of moderate length. The longest preopercular spine is as long as the eye, which is ⅙ as long as the head to the end of the opercular spine, and equal to the width of the space between the eyes. Snout equals length of orbit. Jaws equal, the lower not at all received within the upper. Maxilla, longer than fourth dorsal spine, equals one-half length of head to end of opercular spine, and extends to hind margin of orbit. Head one-third, or slightly less than one-third of total length, caudal included. Longest dorsal spine is contained 7 to 9 times in total with caudal. The longest anal ray is contained about 3 times in length of head. Caudal and ventral equal to one-half length of head. Pectoral as long as post-orbital part of head and does not reach the vent, which is in the middle of the total length with caudal. Caudal rounded. Height of body at origin of dorsal is a little less than its width at the base of the pectorals and is contained from 5 to 6 times in total length, caudal included. The spinous dorsal begins at a distance from the tip of the snout equal to one-third of the total length without caudal. Skin smooth.

Colors of the alcoholic specimens: Very dark brown (almost black) with a purplish tinge in some individuals; sides mottled with lighter brown and whitish and frequently bearing large, roundish white blotches similar to those of the male *C. grönlandicus*. These white blotches in some instances become confluent over the greater portion of the belly. Posterior surface of the pectoral with white blotches near the margin in some examples, and uniform dark brown in others. There is no individual that is entirely free from white blotches. In some examples the belly is dark, very little mingled with whitish. Lips and lower surface of head in some examples have numerous nearly black spots, the largest of which are not more than one-third as long as the eye. The largest of the types is 10 inches long.

*Cottus niger* has many points of resemblance to *C. Brandti* Steind., but there are too many important discrepancies to allow me to identify it with Steindachner's species. (1) the length of the head is not more than ⅓ of total length with caudal in any of our 14 examples; (2) the vomerine, intermaxillary, and mandibulary teeth are all of equal size and strength; (3) the distance between the eyes measured on the bone is always equal to the length of the eye (⅔ of length of eye in *Brandti*); (4) there are no prominent occipital ridges such as are figured in *C. Brandti*, but the vertex has numerous slender filaments; (5) the length of the ventral is ½ that of the head (⅖ in *C. Brandti*); (6) the length of the caudal is nearly twice as great as the distance of the front margin of the eye from the tip of the jaws; (7) the bony plates of the lateral line are so thin and soft that they are inconspicuous under the skin; (8) the ventrals of *C. niger* are always either purplish dark-brown with whitish tips, or whitish with several dark bands. There are white blotches on all our examples notwithstanding the great variation in size.

**Cottus verrucosus, n. s.**

27547 (1638). Plover Bay, Siberia, August 13, 1880, T. H. Bean.

Br. VI; D. XI, 16; A. 15; V. I, 3; P. 17; C. 12 (developed rays).

Length of the typical specimen 3½ inches (88 millimeters).

Two sharp spines above the snout. A short tentacle above the posterior part of each orbit and one on each side of the vertex. Vertex and interorbital space deeply concave. Crown, nape, and interorbital region with small skinny warts. Three preopercular spines, the uppermost being as long as the short diameter of the eye. Eye equals snout which is ¼ as long as the head to the end of the opercular spine. Lower jaw barely included within the upper. The maxilla is longer than the fourth dorsal spine, which is only a little longer than the eye and less than ⅓ as long as the head. The maxilla equals ⅙ of the total length without the caudal, and nearly ½ the length of the head; it extends to below the middle of the eye. The mandible extends to the hind margin of the eye; its length equals ½ the distance from the tip of the snout to the beginning of the dorsal. The head is ⅓ of the total length with caudal. Teeth in the jaws and on the vomer. The longest dorsal spine equals the longest anal ray and ⅒ of the total length with caudal. The length of the ventral equals ⅙ of the total length without the caudal. The vent is slightly in advance of the middle of the length with caudal. The pectoral reaches to the origin of the anal. The caudal is ½ as long as the head. The height of the body at the beginning of the dorsal is contained 4½ times in the total length without the caudal, and is a little greater than its greatest width. The distance of the first dorsal from the tip of the snout equals about ⅓ of the total length without the caudal. Skin smooth. Lateral line with numerous short accessory branches extending upward and downward and placed exactly opposite each other.

Colors of the alcoholic specimen: Upper parts very dark brown; belly and under surface of head whitish; whitish on the sides along and behind the anal fin; spinous dorsal colored like the body but with a median and a posterior light band; soft dorsal with about five dark-brown bands alternating with whitish; caudal whitish on its anterior third, the rest of the fin having brown on the skin covering the fin-rays; the pectoral has five brown bands; the anal is all whitish except a dark stripe running through near its middle; the ventrals are whitish.

**Gymnacanthus galeatus, n. s.**

Museum catalogue number 28097; collector's number (1603). Five individuals were caught on a trawl-line at Iliuliuk, Unalashka, July 30, 1880, for Messrs. Dall & Bean, by Sylvanus Bailey.

As these specimens differ in several important details from our examples of *G. pistilliger* from the Atlantic and from Siberia as well, I will briefly indicate the differences and call attention to them by giving the species a new name.

The smallest example is 7⅗ inches long; the largest, 10½ inches.

Br. VI; D. XI, 16–17; A. 19; V. I, 3; P. 19–20.

No vomerine teeth. Two small spines above the snout; a small tubercle at the upper posterior margin of each orbit. Four preopercular spines, the upper as long as the short diameter of the eye, bearing two or three antler-like processes. The space between the eyes is deeply concave and *completely covered* by aggregated bony granulations, as are also the crown and the neck. Similar bony granulations are at the hind margin of the orbit, on the suborbital ridge, and on the opercles. The body is naked. The pectorals and, in males, the ventrals reach beyond the origin of the anal; in females the ventrals do not reach the vent. Dorsals and pectorals with interrupted black bands as in *G. pistilliger;* ventrals and anal uniform whitish; back with four distinct brown spots, the longest nearly twice as long as the eye, extending a little below the lateral line, and there blending into an interrupted wavy brown lateral stripe. The maxilla extends to below the middle of the eye. *The greatest height of the body is contained twice in the length of the head*, and 7½ times in the total length including the caudal. Pectoral as long as the head without the snout, its upper axil immediately under the beginning of the spinous dorsal.

*Gymnacanthus galeatus* may be at once distinguished from *G. pistilliger* by its longer and more bony head and its elongate form. I have compared it with specimens of *G. pistilliger* from Norway, Cumberland Gulf, and Eastern Siberia.

**Hemilepidotus Jordani, n. s.**

Museum number 27598; collector's number (1602).

Length of larger type, 13 inches; smaller, 10⅕ inches.

Taken at Iliuliuk, Unalashka Island, on a trawl-line, by Sylvanus Bailey, July 30, 1880.

Larger, D. X, i, 21; A. 17; V. i, 4.

Smaller, D. X, i, 21; A. 16; V. i, 4.

The dorsal band of scales contains 4 rows at the widest part (6 rows in *spinosus*).

Height of body $1\frac{2}{3}$ times in length of head, and $4\frac{1}{2}$ times in total length without caudal. Length of head $2\frac{2}{3}$ times in length of fish without caudal.

Eye equals snout and one-fourth of head. Interorbital space equals short diameter of eye (only half of short diameter in *spinosus*).

Distance of spinous dorsal from tip of snout equals length of pectoral (the pectoral is much shorter in *spinosus*).

First spine of dorsal equals maxilla in length (only half as long as maxilla in *spinosus*). Longest dorsal spine (5th) is contained $2\frac{1}{2}$ times in length of head (4 times in *spinosus*).

Pectoral reaches to origin of anal; ventral, nearly or quite to vent.

Maxilla extends slightly behind middle of eye; mandible, to posterior margin of eye.

Throat and belly pure white. No spots as in *trachurus*.

**Hexagrammus scaber**, n. (?) s.

? *Hexagammus superciliosus* (Pall.)

In the collection of Alaskan fishes are two small individuals of the genus *Hexagrammus*, which I cannot refer definitely to any known species. They are nearest to *H. superciliosus* Pallas, but, as we have none of the young of this species, I must compare them with half-grown examples. From these and from the adult my species differs (1) in having a rudimentary but quite distinct median lateral line, (2) in the absence of palatine teeth, (3) in having a forked caudal, whereas *superciliosus* has a distinctly rounded caudal. It may be found that a large series of specimens of different ages will show a gradation into *superciliosus* by the acquisition of palatine teeth, the obsolescence of the median lateral line, and a change in the form of the caudal; but there is nothing to base such a conclusion upon at present, and I desire to call attention to the form by describing it as probably new.

The types are numbered 23961, Amchitka, W. H. Dall, and 27920, Unalashka, T. H. Bean. The first measures $2\frac{2}{10}$ inches and the second $2\frac{1}{10}$ inches to the base of the middle caudal rays.

23961—D. XX, 25; A. 23; V. i, 5; L. lat. about 100; 6 lateral lines.

27920—D. XXI, 25; A. 24; V. i, 5; L. lat. about 107; L. transv. about 50; 6 lateral lines.

In this description number 27920 is taken for the principal type, since, being a more recent specimen, it shows the characters more clearly.

Body oblong, moderately compressed, its depth near the origin of the dorsal equals the length of the head (excluding the opercular flap) and is contained $4\frac{1}{2}$ times in the total length to the base of the middle caudal rays; upper outline of head convex, but with a slight frontal depression. The least height of the tail equals one-half the length of the head, or one-ninth of the total length to base of caudal.

The distance between the eyes is contained three times in the length of the head. The snout is blunt and only two-thirds as long as the eye, which is one-third as long as the head and equals the interorbital distance. Jaws equal. The maxilla does not quite reach to below the anterior margin of the pupil, and is one-third as long as the head. The mandible extends to below the middle of the eye and is contained 10 times in the total length to base of middle caudal rays. A tentacle above each orbit. Teeth in the jaws and in the vomer; none on the palatine bones.

The spinous dorsal originates immediately over the base of the pectoral; its longest spine is one-eleventh as long as the fish without the caudal. The longest ray of the second dorsal equals the length of the post-orbital part of the head. The dorsals are separated by a deep notch, immediately under which the anal originates.

The length of the anal base equals one-third of total length without the caudal. The vent is equidistant from the tip of the snout and the base of the middle caudal rays.

The middle caudal rays are only ⅔ as long as the longest rays, the caudal being decidedly forked.

The distance of the pectoral from tip of snout equals one-fourth of the total length to base of middle caudal rays; the pectoral does not quite reach to the vent; its length equals that of the head including the opercular flap.

The distance of the ventral from the snout is slightly more than twice the length of the ventral, which is one-seventh of the total length to base of middle caudal rays.

There are 6 lateral lines on each side, the uppermost of which meets its fellow of the opposite side in front of the dorsal, is continued forward on the nape by a single short line, runs backwards close to the dorsal, base and ends at about the beginning of the last third of the soft dorsal. The second begins on the nape, is one-half as far from the uppermost as it is from the third, and extends to the caudal. The third begins at the extreme upper limit of the gill-opening, curves very gradually to follow the dorsal outline until it reaches the end of the second dorsal, whence it runs straight out on the caudal. The fourth begins a little above the pectoral, curves very slightly downward and disappears about the middle of the body; it is not so well developed as the rest. The fifth originates close under the pectoral, near the gill-opening, passes above the ventral and on the lower part of the side of the body, ending at about the beginning of the last third of the anal. The sixth meets its fellow of the opposite side a little behind the ventral base (a single line extending forward from this junction on the median line of the belly as far as the throat) and runs backward close to the base of the anal fin, ending on the caudal. The scales are everywhere very rough.

Colors: Each of the dorsals has 3 black blotches, smaller than the eye, resembling bands but not extending to the bases of the fins. The pectorals, ventrals, and anal are uniform yellowish white. The body is light brown above and silvery or golden on the sides and lower parts.

**Coregonus laurettæ, n. s.**

Among the fishes brought down from northern Alaska during the summer of 1880 are 4 white-fish taken at Point Barrow by the U. S. S. Thomas Corwin, Capt. C. L. Hooper commanding, and one of the same species obtained at Port Clarence, by the U. S. Sch. Yukon. The museum catalogue numbers of these specimens are:

27695. Point Barrow, 1880, (4 examples).

27915. Port Clarence, 1880, (1 example).

The species is allied to *C. Artedi* Le Sueur and to (C.) *lucidus* Richardson. It differs from *C. Artedi* in the following particulars:

(1) The eye is 1/5 as long as the head (1/4 in *Artedi*);

(2) The length of the dorsal base corresponds with that of 16 oblique series of scales immediately under it (10 in *Artedi*);

(3) The length of the mandible is contained 2⅓ times in that of the head (2⅛ times in *Artedi*);

(4) The lateral line runs through 84 to 95 scales (not more than 77 in *Artedi*); there are 10 scales in a transverse series from the origin of the dorsal to the lateral line and as many from the origin of the ventral to the lateral line ( 9–9 in *Artedi*);

(5) The ventral has 12 rays (11 in *Artedi*).

From *C. lucidus* it is separated by the following characters:

(1) There are lingual teeth (none in *lucidus*);

(2) The ventral appendages are less than one-half as long as the ventral (more than one-half in *lucidus*);

(3) The transverse rows of scales between the origins of dorsal and ventral and the lateral line are 10–10 (10–8 in *lucidus*);

(4) The lower jaw is contained 2⅓ times in length of head (2⅛ times in *lucidus* according to Richardson's measurements);

(5) Judging from the figure given by Richardson the number of rows of scales under the dorsal base of my species is 6 greater than in *lucidus*.

## DESCRIPTION.

Br. IX—X; D. 11—12 divided rays; A. 10—11 divided rays; V. 12; P. 16; L. lat. 84–95; length of types 12—16 inches.

The height of the body is greater than the length of the head and equals one-fourth of the total length without the caudal; the distance of the nape from the front margin of the jaw is contained 2½ times in its distance from the beginning of the dorsal. The diameter of the eye equals the length of the snout and about 1/5 that of the head. Maxillary reaches nearly to the middle of the eye, its length contained 3½ times in that of the head; the supplemental bone is slightly more than half as long as the maxilla and its greatest width equals 1/3 of its length. The length of the mandible equals 3/7 of that of the head, reaching to the hind margin of the orbit. The appendage of the ventral fin is less than half as long as the fin and nearly equal in length to the 7 scales immediately over it.

This white-fish is also represented in the National Museum by two well-preserved specimens (Nos. 24023 and 24024) collected by William H. Dall, March 12 and March 19, 1867 (collector's numbers 666 and 672), at Nulato on the Yukon River.

I dedicate the species to my wife, Lauretta H. Bean.

**Ptilichthys**, n. g. (*Mastacembelidæ?*)

Body elongate, serpentiform, apparently covered with very thin scattered scales. Mandible little movable, projecting, with a skinny appendage at tip. Cleft of the mouth narrow. Minute teeth in a single series in the jaws, becoming larger and slightly curved posteriorly. Margin of upper jaw formed entirely by the intermaxillaries. Maxilla curved forward below. The gill-opening extends up to the middle of the base of the pectoral; the membrane is slightly emarginate behind and is free from the isthmus; 4 gills, a slit behind the fourth. Gill-rakers stout and short, moderate in number. Spinous portion of the dorsal consisting of many isolated spines, a narrow membrane behind each. Soft dorsal and anal with many rays. End of the tail free. Ventrals none.

**Ptilichthys Goodei**, n. s.

Museum number 26619, collector's number (1590)—Dall and Bean.

Dredged in 10 fathoms at the entrance to Port Levasheff, Unalashka, on the ridge, hard bottom, by Sylvanus Bailey, July 28, 1880.

I am indebted to the Alaska Commercial Company of San Francisco for the loan of the only other known specimen, an example 302 millimeters long taken at Unalashka. Length of type 160 millimeters. The species is dedicated to my colleague, Mr. G. Brown Goode.

Br. V; D. XC, 145; A. ca. 185; P. ca. 12.

Greatest height of body equals the post-ocular part of the head. Eye, equal to snout, 5 in head. Head 15⅓ times in total length. Maxilla extends to a little beyond the front margin of the orbit; mandible to middle of the eye. The mandibulary appendage is one-half as long as the eye. The dorsal begins slightly in advance of the pectoral; the spinous portion equals 6½ times the length of the head. The distance from the tip of the lower jaw to the anus equals 4⅔ times the length of the head. The anal begins under the fifty-third spine of the dorsal. The pectoral is half as long as the head. None of the dorsal spines are quite equal to half the length of the eye. The soft dorsal and the anal are highest near the middle of their length; the height of each equals about ¾ of the body height at the same point. The free caudal tip is about ⅔ as long as the eye.

**Raia parmifera**, n. s.

Collector's number (1753); Museum number 27651.

Taken at Iliuliuk, Unalashka, October 12, 1880, and preserved almost entire after measurements and color notes were made.

Disk broader than long; tip of snout slightly projecting. Anterior margin of pectorals convex in front, then shallow concave, posterior margin convex. Interorbital distance, measured on the bone, is contained 3½ times in distance from tip of snout to a line connecting the front margins of the orbits. Interocular space deeply concave in the preserved specimen.

Breadth of disk equals distance from tip of tail to shoulder-girdle. Length of tail equals distance from its root to middle of eye.

Tail nearly flat below with a well-marked lateral fold which is widest posteriorly, but nowhere equals the height of the caudal. Caudal small, its height (7$^{mm}$) contained 3 times in its length (21$^{mm}$).

Mouth slightly arched, its width equal to 3 times the length of first dorsal base. Nasal flaps with a few fringes posteriorly. Distance between nostrils contained 1½ times in their distance from tip of snout. Teeth in 26 or 27 rows, with a short, moderately sharp median cusp, which is occasionally much worn in the front of the jaws.

The largest spiny bucklers on the back are 17 millimeters long at the base.

Snout above, supra-occipital region and the whole margin of pectorals and ventrals covered with small prickles, as is also an area along the tail, especially on its anterior half. Along the middle of the back and the top of the tail is a row of 29 large spines. Between the dorsals is a single large spine. Along the sides of the tail are spines a little larger than those around the margin of the disk. The greater portion of the disk is smooth. In a male, number 28098, of which we have portions only, the bucklers are in about 22 rows, with 6 in a row at the widest part; the claspers are slender and more than one-half as long as the tail.

Under surface smooth, with the exception of an elliptical patch of small spines near the tip of the snout.

General color olive-brown above. There are numerous indistinct light blotches on the disk, two of them larger than the rest; the largest is twice as long as the eye, and surrounds an inner blotch of white nearly as long as the eye. There are two small light blotches, one on each side of the tail, between the 17th and 18th spines of the median series.

*Measurements.*

| | |
|---|---|
| Current number of specimen | (1753)<br>27651 ♀ |
| Locality | Unalashka,<br>Oct. 12, 1880. |
| | Millimeters. |
| Extreme length | 975 |
| Length of disk | 597 |
| Body: | |
| Greatest width of disk | 685 |
| Greatest width of tail at base* | 47 |
| Length of branchial area | 70 |
| Width of branchial area in front | 196 |
| Width of branchial area behind | 186 |

*Measurements*—Continued.

| | Millimeters. |
|---|---|
| **Head:** | |
| Distance between outer edges of spiracles | 119 |
| Greatest width of mouth | 105 |
| Width of interorbital area on the bone | 48 |
| Length of snout from eye | 153 |
| Length of eye | 30 |
| Length of snout from mouth | 140 |
| Length of spiracles | 32 |
| Distance from snout to first dorsal | 875 |
| Distance between outer humeral spines | 125 |
| **Dorsal:** | |
| Length of base of first dorsal | 32 |
| Height of first dorsal | 24 |
| Interval between dorsals | 16 |
| Length of second dorsal | 30 |
| Height of second dorsal | 26 |
| Length of base of ventrals | 184 |
| Distance from snout to end of base of pectoral | 510 |
| Distance between outer edges of nostrils | 90 |
| Distance from snout to outer angle of disk | 463 |
| **Caudal:** | |
| Length of base | 21 |
| Height | 7 |
| **Ventral:** | |
| Length | 68 |

* Taken where the ventral insertion ends.

**Ammocœtes aureus**, n. s.

? *Petromyzon Fluvialis* Rich. Franklin's First Journey, 1823, p. 705; F. B. A., p. 294.

? *Petromyzon borealis* Grd. Pacific R. R. Report, Fishes, p. 377 (without description).

Maxillary tooth single, bicuspid; mandibulary with seven cusps, those at the ends being larger than the other five. Head shorter than the space occupied by the branchial openings and contained 10½ times in the total length (5½ times in the distance from the end of the lip to the beginning of the first dorsal). The distance from the eye to the first dorsal is 3 times as long as the first dorsal base. Second dorsal base is twice as long as the first, and the fin is twice as high as the first at its highest part. The interspace between the dorsals is about ⅔ as long as the head. The distance from the vent to the end of the tail is one-fourth of the total length. Eye nearly twice as large as the largest branchial opening.

Colors of the alcoholic example: Back plumbeous, sides and belly golden yellow, under surface of head and neck silvery.

Length of type, 15 inches; catalogue number, 21524; collector's number, 1038, Anvik, Yukon River, Alaska, Lucien M. Turner (Lat. 63° N., Lon. 160° W. from Greenwich). Mr. Turner notes that it is extremely abundant and is used for food.

U. S. NATIONAL MUSEUM, *May* 5, 1881.

## DESCRIPTION OF A NEW SPECIES OF FISH, APOGON PANDIONIS, FROM THE DEEP WATER OFF THE MOUTH OF CHESAPEAKE BAY.

### BY G. BROWN GOODE AND TARLETON H. BEAN.

Among the fishes collected in October, 1880, by Capt. Z. L. Tanner, on the Fish Commission steamer Fish Hawk, off the entrance to Chesapeake Bay, is a single specimen of a species of *Apogon*, apparently new to science. The specimen being somewhat mutilated, this description is necessarily incomplete.

**Apogon pandionis**, new species. Goode and Bean.

Body oblong, rather robust, its greatest width (behind the gills) being equal to half the length of the head, and contained six times in the length of body without caudal; its greatest height contained about thrice and two-thirds in the body length. Least height of tail almost equal to half the greatest height of the body. Scales, small cycloid, forty-five in the lateral line; three longitudinal rows above and nine below the lateral line; lateral line complete.

Length of head one-third of standard length of body, its greatest width equal to greatest width of body. Length of snout four and one-half times in length of head. Maxilla extends to a point a very little behind the anterior margin of the pupil, the mandible to the vertical from the middle of the eye. Length of maxilla equal to long diameter of the eye. Preoperculum apparently unarmed. Operculum with two flexible points near its upper posterior angle. Gill-rakers very long and slender.

Eye nearly circular, its longest diameter nearly equals half the length of the head and is contained seven times in the standard body length nearly horizontal. Width of interorbital space equals two-thirds the diameter of the eye. Mouth oblique, the lower jaw projecting. Dentition in jaws hardly perceptible. Feeble teeth on the head of the vomer and on the palatine bones.

Distance of dorsal from snout equal to twice the greatest width of the body; its longest spine (fourth) equal in length to three-fourths the diameter of the eye. Distance from origin of first dorsal to origin of second dorsal equal to twice the length of the base of the latter

Distance of anal from snout equal to twice the length of the head; the length of its base is equal to two-thirds the length of the eye; of its longest ray to the length of the maxilla. First anal spine minute, its length equal to one-fourth of the least height of the tail; the second anal spine at least twice as long as the first. Caudal deeply furcate, scaled upon the lower portions of the lobes.

Distance of pectoral from snout equal to length of head; its length equal to that of the maxilla.

Distance of ventral from snout slightly greater than one-third of the standard body length.

*Radial formula.*—D. VII, I, 9; A. II, 7½; P. 16; V, I, 5.

*Scales*, in lateral line, 45; above lateral line, 3; below, 9.

*Color* nearly uniform light, reddish brown, with no blotches. Scales finely punctulate withback.

Our description is based upon museum specimen No. 26228.

Among the other interesting forms collected in the same locality is a young specimen of *Hoplostethus mediterraneus*, and also a species of *Scorpæna*, soon to be described.

## METALLIC CASTINGS OF DELICATE NATURAL OBJECTS.

[Translated.]

The following process is recommended by Abbass for producing metallic castings of flowers, leaves, insects, &c. The object, a dead beetle for example, is first arranged in a natural position, and the feet are connected with an oval rim of wax. It is then fixed in the centre of a paper or wooden box by means of pieces of fine wire, so that it is perfectly free, and thicker wires are run from the sides of the box to the object, which subsequently serve to form air-channels in the mold by their removal. A wooden stick, tapering toward the bottom, is placed upon the back of the insect to produce a runner for casting. The box is then filled up with a paste of three parts of plaster of Paris, and one of brick-dust, made up with a solution of alum and sal ammoniac. It is also well first to brush the object with this paste to prevent the formation of air bubbles. After the mold thus formed has set, the object is removed from the interior by first reducing it to ashes. It is therefore dried slowly, and finally heated gradually to a red heat, and then allowed to cool slowly to prevent the formation of flaws or cracks. The ashes are removed by pouring mercury into the cold mold and shaking it thoroughly before pouring it out, and repeating this operation several times. The thicker wires are then drawn out, and the mold needs simply to be thoroughly heated before it is filled with metal in order that the latter may flow into all portions of it. After it has become cold it is softened and carefully broken away from the casting.

## THE OCCURRENCE OF THE CANADA PORCUPINE IN MARYLAND.

### By OTTO LUGGER.

Referring to the paper on the occurrence of the Canada Porcupine in West Virginia by Mr. Goode, in Vol. I, Proceedings U. S. National Museum, page 264, I wish to mention that this Porcupine, *Erethizon dorsatus*, is still, though rarely, found in Maryland. In the museum of the Maryland Academy of Sciences is a specimen from Alleghany

County, Maryland. Another specimen I saw living in confinement in the Blue Ridge Mountains, where it was caught two years ago. One was killed quite recently near Ellicott City, Maryland.

MARYLAND ACADEMY OF SCIENCES,
*Baltimore, May* 22, 1881.

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## NOTE ON THE LATILOID GENERA.

### By THEODORE GILL.

In a late number of the Proceedings of the U. S. National Museum (Vol. IV, p. 53), Messrs. Jordan and Gilbert have accepted the name *Dekaya* instead of *Caulolatilus* for a genus of the family *Latilidæ*, with a foot-note, "*Caulolatilus*, Gill: *nomen nudum*." In order that the adoption of this view may be at once arrested, it is advisable to give a history of those names.

In 1862, in the "Proceedings of the Academy of Natural Sciences of Philadelphia" (p. 240), the name *Caulolatilus* was proposed as the generic denomination of *Latilus chrysops* and its allies, in the following terms:

"The *Malacanthini* of Poey form a natural family. The *Latilus chrysops*, Val., does not, however, appear to be congeneric with the type of *Latilus*, but is distinguished by its form and the structure of the fins. It may be called *Caulolatilus chrysops*."

It will be thus seen (1) that the respects in which *Caulolatilus* differs from *Latilus* were indicated; (2) the relationships were exactly appreciated; (3) a specific type was mentioned. There could consequently be no doubt as to what was meant nor as to the characters by which it should be distinguished.

In 1864, in the "Proceedings of the California Academy of Natural Sciences" (Vol. 3, p. 70), Dr. Cooper proposed the name of *Dekaya* for a supposed new fish, concerning which he had not the slightest conception as to its proper relationships, considering it "to be a very aberrant form of the *Percoid* family, having many of the characters of other *orders*" [sic!], but that on the whole it seemed to be most nearly related to "the genus *Heterognathodon*, of Bleeker." The remarks respecting the "other orders" and the affinities indicated the most complete misapprehension as to the type. The description was equally at fault. The "general shape" was said to be "elongated and fusiform," although a shape less "fusiform" could scarcely be associated with moderate elongation. In other respects the description was faulty and erroneous or vague, but these lapses need not detain longer.

The question arises in such a case, What is the advantage of any description? According to the rules of the British and American associations for the advancement of science, a description is necessary as the basis of permanent nomenclature, but like many of the other rules propounded in those codes, there is no proper logical basis therefor. If a description is necessary, it is necessary that the description should be apt, but, as every naturalist is well aware, the description is completely ignored in practice. We adopt, for example, the name *Perca* and many others from Linnæus and his successors, but inasmuch as those names were applied by older naturalists to forms that are now relegated to distinct families, it will be obvious that no regard whatever is paid to the *definitions*. This is recognized to such an extent that it is now admitted that a definition is only necessary to show that the writer had some idea as to what he was treating about. In the case in question, (1), on the one hand, it is evident from the words that the author of *Caulolatilus* did have an adequate idea as to both what he was writing of and as to the true distinctions of the fish considered, and (2), on the other hand, that the author of the name *Dekaya* had not the least conception of the nature of the form he described, and that the name originated simply from an almost inexcusable blunder and ignorance of the subject he ventured to write upon. There would therefore seem to be no doubt that in any case the name *Caulolatilus* should be retained in preference to *Dekaya*. But it so happens that there is no complication in the consideration of the choice of names even from the extreme standpoint from which it is viewed by Messrs. Jordan and Gilbert. The name *Dekaya* is inadmissible as the denomination of the *Latiloid* fish, if for no other reason, because the same name under the form *Dekayia* had been applied previously by Messrs. H. Milne Edwards and Haime to a genus of *Corals* of the family *Chætetidæ*. (DEKAYIA, *H. Milne Edwards et J. Haime*, Monographie des Polypiers fossiles des Terrains Palæozoïques *in* Archives du Muséum d' Histoire Naturelle, t. 5, p. 154, 1851; *H. Milne Edwards*, Histoire Naturelle des Corallaires ou Polypes proprement dits, t. 3, p. 283, 1860.)

The history of the genus may therefore be epitomized as follows:

## CAULOLATILUS.

### *Synonymy.*

=Caulolatilus *Gill*, Proc. Acad. Nat. Sci. Phila., [v. 14,] p. 240, 1862. (Characters indicated.)

=Dekaya *Cooper*, Proc. Cal. Acad. Nat. Sci., v. 3, p. 70, 1864. (Described, but erroneously, and name preoccupied by Edwards and Haime in 1851.)

=Caulolatilus *Gill*, Proc. Acad. Nat. Sci. Phila., [v. 17,] p. 66, 1865. (Fully described.—Adopted by Cooper (later), Poey, Bleeker, Goode and Bean, Jordan & Gilbert (at first.)

=Dekaya *Jordan & Gilbert*, Proc. U. S. Nat. Mus., v. 4, p. 53, 1880. (Name revived for *Caulolatilus*.)

latilus sp. *Cuv. et Val.*, *Günther*, etc.

Type *Caulolatilus chrysops*=*Latilus chrysops* C. & V.

The following genus is very nearly allied, viz:

### PROLATILUS.

*Synonymy.*

=Prolatilus *Gill*, Proc. Acad. Nat. Sci. Phila., [v. 17,] p. 67, 1865.
latilus sp. *Cuv. & Val.*, *Jenyns*, *Günther*, etc.

Type *Prolatilus jugularis*=*Latilus jugularis* C. & V.

Apparently closely related to *Prolatilus* is Pinguipes, viz:

### PINGUIPES.

*Synonymy.*

=Pinguipes *Cuv. & Val.*, Hist. Nat. des Poissons, t. 3, p. 277, 1829.

Type *Pinguipes brasilianus* C. & V.

The following genus has been associated with the preceding by all who have treated of them, save Dr. P. von Bleeker. That ichthyologist has referred *Latilus* to the family of "Percoidei" and its tenth subfamily, "Spariformes" and "Phalanx Denticini," and removed *Caulolatilus* and *Prolatilus* from all close relationship therewith. "(Spec. plures familiæ Parapercioid. adnumer.)" What are the exact affinities must be determined by a study of the anatomy.

### LATILUS.

*Synonymy.*

<Latilus *Cuv. & Val.*, Hist. Nat. des Poissons, t. 5, p. 369, (t. 9, p. 495,) 1830.
=Latilus *Gill*, Proc. Acad. Nat. Sci. Phila., [v. 17,] p. 67, (by exclusion,) 1865.
=Latilus *Bleeker*, Archives Néerland. Sc. exactes et nat., t. 11, p. 279, 1876.

Type *Latilus simus*=*Coryphæna sima* Bl. Schneid.=*Latilus argentatus* C. & V.

To *Latilus* the following genus seems to be most nearly related, but whether such is really the case cannot be considered settled till its osteology is examined.

### LOPHOLATILUS.

*Synonymy.*

=Lopholatilus *Goode & Bean*, Proc. U. S. Nat. Mus., v. 2, p. 205, 1879.

Type *Lopholatilus chamæleonticeps* Goode & Bean.

## LIST OF SPECIES OF MIDDLE AND SOUTH AMERICAN BIRDS NOT CONTAINED IN THE UNITED STATES NATIONAL MUSEUM.

By ROBERT RIDGWAY.

[Corrected to July, 1881.]

[None of the species named in the following list are at present in the collection of the United States National Museum, and any of them that can be supplied by correspondents of the Museum, or of the Smithsonian Institution, will be very thankfully received.]

### Family TURDIDÆ.

Catharus aurantiirostris (*Hartl.*). Venezuela.
mexicanus *Bp.* Mexico to Veragua.
mentalis *Scl. et Salv.* Bolivia.
phæopleurus *Scl. et Salv.* Colombia.
alticola *Godm. et Salv.* Guatemala.
Turdus luridus *Bp.* Colombia.
fumigatus *Licht.* Venezuela to Brazil.
fuscater *Lafr. et d'Orb.* Bolivia and Argentine Republic.
olivater *Lafr.* Venezuela.
nigriceps *Jelski.* Western Peru.
brunneus *Lawr.* Upper Amazons.
leucops *Taczan.* Northwestern Peru.
maranonicus *Taczan.* Northern Peru.
Margarops sanctæ-luciæ *Scl.* Sta Lucia, West Indies.
Harporhynchus ocellatus *Scl.* Southwestern Mexico.
Mimus dorsalis (*Lafr. et d'Orb.*). Bolivia.
lividus *Licht.* Eastern Brazil.
patachonicus (*Lafr. et d'Orb.*). Patagonia and Arg. Rep.
trifasciatus *Gould.* Galapagos.
parvulus *Gould.* Galapagos.

### Family PTILOGONATIDÆ.

Myiadestes ardesiaceus *Less.* Brazil.
griseiventer *Tschudi.* Peru.
montanus *Cory.* Haiti.
Cichlopsis leucogonys *Cab.* Brazil.

### Family SYLVIIDÆ.

Polioptila plumbeiceps *Lawr.* Venezuela.

## Family TROGLODYTIDÆ.

Campylorhynchus gularis *Scl.* Mexico.
nuchalis *Cab.* Venezuela and Trinidad.
variegatus (*Gm.*). Brazil.
hypostictus (*Gould.*) Upper Amazons and Colombia.
bicolor *Pelz.* Guiana.
Cinnicerthia peruana (*Caban.*). Peru.
Cyphorinus modulator (*d'Orb.*). Amazons.
dichrous *Scl. et Salv.* Colombia.
Microcerculus bambla (*Bodd.*). Guiana.
albigularis *Scl.* Eastern Ecuador.
marginatus *Scl.* Peru and Colombia.
squamatulus *Scl. et Salv.* Venezuela.
tæniatus *Salv.* Western Ecuador.
Thryophilus rufiventris *Scl.* Interior of Brazil.
minor (*Pelz.*). Interior of Brazil.
longirostris (*Vieill.*). Brazil.
nisorius *Scl.* Mexico.
fulvus *Scl.* High Peru.
Thryothorus coraya (*Gm.*). Guiana and Amazonia.
mystacalis *Scl.* Western Ecuador and Colombia.
euophrys *Scl.* Western Ecuador.
cantator *Jelski.* Central Peru.
sclateri *Taczan.* Northern Peru.
Troglodytes tessellatus *Lafr. et d'Orb.* Panama to Bolivia.
Cistothorus graminicola *Jelski.* Central Peru.
brunneiceps *Salv.* Western Ecuador.
æquatorialis *Lawr.* Ecuador.

## Family MOTACILLIDÆ.

Anthus chii *Vieill.* Southern Brazil and Uruguay.
nattereri *Scl.* Southern Brazil.
peruvianus *Nicholson.* Peru.
calcaratus *Taczan.* Central Peru.
brevirostris *Taczan.* Central Peru.

## Family MNIOTILTIDÆ.

Dendrœca eoa *Gosse.* Jamaica.
Geothlypis speciosa *Scl.* Eastern Mexico.
semiflava *Scl.* Ecuador.
chiriquensis *Salv.* Chiriqui.
Basileuterus hypoleucus *Bp.* Eastern Brazil.
bivittatus (*Lafr. et d'Orb.*). Costa Rica to Bolivia.
griseiceps *Scl. et Salv.* Venezuela.
cinereicollis *Scl.* Colombia.

Basileuterus mesoleucus *Scl.* Guiana.
luteoviridis *Bp.* Colombia.
leucophrys *Natt.* Brazil.
euophrys *Scl. et Salv.* Bolivia.
cabanisi *Berlepsch.* Venezuela.
conspicillatus *Salv. et Godm.* Colombia.
trifasciatus *Stolzm.* Northern Peru.
striaticeps *Caban.* Central Peru.
diachlorus *Caban.* Central Peru.
castaneiceps *Scl. et Salv.* Western Ecuador.
Setophaga brunneiceps (*Lafr. et d'Orb.*). Bolivia.
ruficoronata *Kaup.* Ecuador.
albifrons *Scl. et Salv.* Venezuela.
flaveola (*Lafr.*). Ecuador.
chrysops *Salv.* Colombia.
melanocephala *Tschudi.* Peru.
castaneocapilla *Caban.* Guiana.
Granatellus pelzelni *Scl.* Amazons.

Family VIREONIDÆ.

Hylophilus thoracicus (*Max.*). Southeastern Brazil and Amazons.
pectoralis *Scl.* Brazil to Guiana.
muscicapinus *Scl. et Salv.* Brazil to Guiana.
semibrunneus *Lafr.* Colombia.
hypoxanthus *Pelz.* Trinidad, Venezuela, and Amazons.
brunneiceps *Scl.* Amazons and Guiana.
ferrugineifrons *Scl.* Colombia and Amazons.
insularis *Scl.* Tobago.
acuticauda *Lawr.* Venezuela.
semicinereus *Scl. et Salv.* Lower Amazons.
fuscicapillus *Scl. ct Salv.* Ecuador.
flaviventris *Caban.* Western Peru.
Vireolanius eximius *Baird.* Colombia.
chlorogaster *Bp.* Amazons.
Cyclorhis albiventris *Scl. ct Salv.* Eastern Brazil.
wiedi *Pelz.* Southern Brazil.
virenticeps *Scl.* Western Ecuador.
contrerasi *Taczan.* Peru.
altirostris *Salv.* Argentine Republic.

Family DULIDÆ.

Dulus nuchalis *Sw.* Antilles.

Family HIRUNDINIDÆ.

Petrochelidon pyrrhonota (*Vieill.*). Paraguay, Brazil, and Mexico.
Tachycineta andecola *Lafr. et d'Orb.* Peru.

Tachycineta leucopygia *Stolzm.* Northern Peru.
Atticora melanoleuca (*Max.*). Eastern Brazil.
cinerea (*Gm.*). Ecuador.
tibialis (*Cass.*). Peru and Panama.
Cotile fucata (*Temm.*). Brazil and Argentine Republic.

### Family CŒREBIDÆ.

Diglossa major *Cab.* Guiana.
carbonaria (*Lafr. et d'Orb.*). Bolivia.
gloriosa *Scl. et Salv.* Venezuela.
glauca *Scl. et Salv.* Bolivia.
pectoralis *Caban.* Central Peru.
mystacalis *Lafr.* Andes of Bolivia.
Diglossopis cærulescens *Scl.* Venezuela to Ecuador.
Oreomanes fraseri *Scl.* Ecuador.
Conirostrum ferrugineiventre *Scl.* Bolivia.
atrocyanea *Lafr.* Bolivia.
cyaneum *Taczan.* Central Peru.
Xenodacnis parina *Caban.* Peru.
Dacnis analis *Lafr. et d'Orb.* Upper Amazons and Guiana.
xanthopthalma *Jelski.* Central Peru.
modesta *Caban.* Peru.
Dacnidea leucogastra *Taczan.* Central Peru.
Certhidea fusca *Scl. et Salv.* Galapagos.
Chlorophanes purpurascens *Scl. et Salv.* Venezuela.
Certhiola caboti *Baird.* Yucatan (Cozumel I.).
magnirostris *Taczan.* Northern Peru.

### Family TANAGRIDÆ.

Chlorophonia frontalis *Scl.* Venezuela.
flavirostris *Scl.* Ecuador.
pretrei (*Lafr.*). Colombia.
Euphonia sclateri *Sund.* Porto Rico.
trinitatis *Strickl.* Trinidad and coast-region of Venezuela and Colombia.
minuta *Cab.* Guiana to Guatemala.
ruficeps *Lafr. et d'Orb.* Bolivia, Amazons, and Venezuela.
vittata *Scl.* Brazil.
gnatho *Cab.* Costa Rica.
chrysopasta *Scl. et Salv.* Upper Amazons and Venezuela.
chalcopasta *Scl. et Salv.* Colombia.
cayana (*Linn.*). Guiana and Amazons.
plumbea *Du Bus.* Amazons.
finschi *Scl. et Salv.* Guiana.
insignis *Scl. et Salv.* Eastern Ecuador.
Tanagrella calophrys *Cab.* Guiana and Upper Amazons.

Pipridea castaneiventris *Scl.* Bolivia.
Calliste fastuosa (*Less.*). Brazil.
florida *Scl. et Salv.* Costa Rica.
graminea (*Spix*). Guiana.
cucullata (*Sw.*). Venezuela.
cyanoptera (*Sw.*). Venezuela.
lavinia *Cass.* Panama to Nicaragua.
albiventris *Gray.* Guiana.
atrocærulea (*Tsch.*). Peru and Bolivia.
cabanisi *Scl.* Western Guatemala
argentea (*Tsch.*). Peru.
rufigenis *Scl.* Venezuela.
hartlaubi *Scl.* Colombia.
xanthocephala (*Tsch.*). Peru and Bolivia.
fulvicervix *Scl. et Salv.* Bolivia.
argyrofenges *Scl. et Salv.* Bolivia.
punctulata *Scl. et Salv.* Bolivia.
melanotis *Scl. et Salv.* Eastern Ecuador.
albertinæ *Pelz.* Brazil.
Iridornis reinhardti *Scl.* Peru.
jelskii *Caban.* Peru.
Pœcilothraupis igniventris (*Lafr. et d'Orb*). Bolivia.
lacrymosa (*Du Bus*). Peru.
melanogenys *Salv. et Godm.* Colombia.
ignicrissa *Caban.* Central Peru.
Buthraupis montana (*Lafr. et d'Orb.*). Bolivia.
edwardsi *Elliot.* (Hab. ignot.)
Compsocoma sumptuosa (*Less.*). Venezuela to Peru.
flavinucha (*Lafr. et d'Orb.*). Bolivia.
Dubusia selysia *Bp.* Ecuador.
Tanagra olivina *Scl.* Interior of Brazil, Peru, and Colombia.
Spindalis zena (*Linn.*). Bahamas.
Ramphocœlus ephipialis *Scl.* Upper Amazons.
uropygialis *Bp.* Guatemala.
chrysonotus *Lafr.* Colombia.
Pyranga erythrocephala (*Sw.*). Mexico.
roseigularis *Cabot.* Yucatan.
Orthogonys cyanicterus (*Vieill.*). Guiana.
Lamprotes albocristatus *Lafr.* Colombia.
Phœnicothraupis gutturalis *Scl.* Colombia.
Lanio versicolor (*Lafr. et d'Orb.*). Bolivia and Peru.
Eucometis penicillata (*Spix*). Guiana and Amazons.
albicollis (*Lafr. et d'Orb.*). Interior of Brazil and Bolivia.
spodocephala (*Bp.*). Veragua to Guatemala.
Tachyphonus phœniceus *Sw.* Upper Amazons.
rufiventris (*Spix*). Upper Amazons.

Tachyphonus intercedens *Berlepsch.* Trinidad.
Nemosia peruana (*Bp.*). Upper Amazons.
ruficeps (*Lafr. et d'Orb.*). Bolivia.
fulvescens *Strickl.* Brazil and Amazons.
sordida (*Lafr. et d'Orb.*). Bolivia.
ornata *Scl.* Western Ecuador.
fulviceps (*Cab.*). Venezuela.
inornata *Taczan.* Northern Peru.
chrysopis *Scl. et Salv.* Ecuador.
Pyrrhocoma ruficeps (*Strickl.*). Southern Brazil and Paraguay.
Chlorospingus flavipectus (*Lafr.*). Colombia.
atripileus (*Lafr.*). Colombia and Ecuador.
melanotis *Scl.* Colombia.
oleagineus *Scl.* Colombia.
verticalis (*Lafr.*). Colombia.
lichtensteini *Scl.* Colombia.
castaneicollis *Scl.* Eastern Peru.
goeringi *Scl. et Salv.* Venezuela.
calophrys *Scl. et Salv.* Bolivia.
cinereocephalus *Jelski.* Central Peru.
chrysogaster *Taczan.* Central Peru.
chrysophrys *Scl. et Salv.* Venezuela.
olivaceus (*Bonap.*). Guatemala.
berlepschi *Taczan.* Central Peru.
nigrifrons *Lawr.* Ecuador.
auricularis *Caban.* Peru.
phæocephalus *Scl. et Salv.* Western Ecuador.
Buarremon torquatus (*Lafr. ct d'Orb.*). Bolivia.
phæopleurus *Scl.* Venezuela.
rufinuchus (*Lafr. et d'Orb.*). Bolivia.
leucopterus (*Jard.*). Ecuador.
albifrenatus (*Boiss.*). Colombia.
meridæ *Scl. et Salv.* Venezuela.
schistaceus (*Boiss.*). Colombia and Ecuador.
semirufus (*Boiss.*). Venezuela and Colombia.
fulviceps (*Lafr. et d'Orb.*). Bolivia.
castaneiceps *Scl.* Ecuador.
specularis *Salv.* Northern Peru.
tricolor *Taczan.* Central Peru.
melanops *Scl. et Salv.* Bolivia.
taczanowskii *Scl. et Salv.* Peru.
castaneifrons *Scl. et Salv.* Interior of Venezuela.
elæoprorus *Scl. et Salv.* Colombia.
melanolæmus *Scl. et Salv.* Southern Peru.
spodionotus *Scl. et Salv.* Ecuador.
comptus *Scl. et Salv.* Ecuador.

Buarremon inornatus *Scl. et Salv.* Ecuador.
melanocephalus *Salv. et Godm.* Colombia.
leucopis *Scl. et Salv.* Ecuador.
castaneiventris *Scl. et Salv.*
Phænicophilus dominicensis *Cory.* Haiti.
Arremon orbignyi *Scl.* Bolivia.
devillei *Bp.* Interior of Brazil.
wuchereri *Scl. et Salv.* Eastern Brazil.
nigriceps *Taczan.* Northern Peru.
Oreothraupis arremonops *Scl.* Eastern Ecuador.
Lamprospiza melanoleuca (*Vieill.*). Guiana.
Psittospiza elegans (*Tsch.*). Peru.
Saltator superciliaris (*Spix*). Amazons, Peru, and Bolivia.
cærulescens *Vieill.* Paraguay and Bolivia.
maxillosus *Cab.* Southern Brazil and Uruguay.
rufiventris *Lafr. et d'Orb.* Bolivia.
orenocensis *Lafr.* Venezuela.
Conothraupis speculigera (*Gould*). Upper Amazons.
Malacothraupis dentata *Scl. et Salv.* Bolivia.
Microspingus trifasciatus *Jelski.* Central Peru.
Pitylus fuliginosus (*Daud.*). Southern and Eastern Brazil.
celæno (*Licht.*). Mexico.
humeralis *Lawr.* Colombia and Ecuador.

### Family FRINGILLIDÆ.

Pheucticus uropygialis *Scl. et Salv.* Colombia and Ecuador.
chrysogaster (*Less.*). Venezuela and Ecuador.
crissalis *Scl. et Salv.* Ecuador.
Geospiza magnirostris *Gould.* Galapagos Islands.
nebulosa *Gould.* Galapagos Islands.
dentirostris *Gould.* Galapagos Islands.
dubia *Gould.* Galapagos Islands.
Gnathospiza raimondi *Taczan.* Northern and Western Peru.
Oryzoborus maximiliani *Cab.* Southern and Eastern Brazil.
occidentalis *Scl.* Ecuador and Colombia.
melas *Scl. et Salv.* Guiana, Amazons, Brazil.
atrirostris *Scl. et Salv.* Peru.
Amaurospiza concolor *Cab.* Costa Rica and Panama.
unicolor (*Burm.*). Brazil.
Spermophila pileata *Scl.* South Brazil and Uruguay.
nigro-rufa (*Lafr. et d'Orb.*). Bolivia and interior of Brazil.
lineata (*Gm.*). Guiana and Lower Amazons.
ocellata *Scl. et Salv.* Upper Amazons and Venezuela.
bicolor *Lafr. et d'Orb.* Bolivia.
obscura *Taczan.* Central Peru.
simplex *Jelski.* Western Peru.

Spermophila euleri *Caban.* Southeastern Brazil.
Neorhynchus nasesus *Bp.* Western Peru.
Camarhynchus crassirostris *Gould.* Galapagos Islands.
psittaculus *Gould.* Galapagos Islands.
variegatus *Scl. et Salv.* Galapagos Islands.
habeli *Scl. et Salv.* Galapagos Islands.
prosthemelas *Scl. et Salv.* Galapagos Islands.
cinereus (*Lafr.*). Northern and Eastern Peru.
Cactornis assimilis *Gould.* Galapagos Islands.
abingdoni *Scl. et Salv.* Galapagos Islands.
pallida *Scl. et Salv.* Galapagos Islands.
Dolospingus nuchalis *Elliot.* Orinoco River.
Phonipara fumosa *Lawr.* Trinidad.
Haplospiza uniformis *Scl. et Salv.* Mexico.
Paroaria capitata (*Lafr. et d'Orb.*). Paraguay and Argentine Republic.
Coryphospingus griseocristatus (*Lafr. et d'Orb.*). Bolivia.
Porphyrospiza cyanella (*Sparm.*). Interior of Brazil.
Tiaris ornata (*Max.*). Brazil.
Xenospingus concolor (*Lafr. et d'Orb.*). Peru.
Poospiza ornata (*Landb.*). Argentine Republic (Mendoza).
torquata (*Lafr. et d'Orb.*). Bolivia and Argentine Republic (Mendoza).
bonapartei *Scl.* Western Peru.
cinerea *Bp.* Brazil.
melanoleuca *Vieill.* Argentine Republic and Paraguay.
cæsar *Scl. et Salv.* Peru.
hypochondriaca (*D'Orb. et Lafr.*). Bolivia.
Spodiornis jardinei *Scl.* Ecuador.
Phrygilus atriceps (*Lafr. et d'Orb.*). Bolivia and Peru.
ocularis *Scl.* Ecuador.
plebeius *Cab.* Peru and Argentine Republic.
melanoderus (*Quoy et Gaim.*). Falkland Islands and Patagonia.
erythronotus (*Phil. et Landb.*). Chili.
Diuca minor *Bp.* Patagonia.
speculifera (*Lafr. et d'Orb.*). Bolivia and Peru.
Catamenia homochroa *Scl.* Ecuador and Colombia.
inornata (*Lafr.*). Bolivia.
"Zonotrichia" quinquistriata *Scl. et Salv.* Mexico.
strigiceps *Gould.* Patagonia.
canicapilla *Gould.* Patagonia.
Spizella pinetorum *Salv.* Guatemala.
Peucæa notosticta *Scl. et Salv.* Mexico.
Ammodromus petenicus *Salv.* Guatemala.
Coturniculus peruanus *Bp.* Bolivia and Upper Amazons to Colombia.
Saltatricula multicolor *Burm.* Argentine Republic.

Embernagra olivascens (*Lafr. et d'Orb.*). Bolivia and Argentine Republic (Mendoza).
superciliosa *Salv.* Costa Rica.
Emberizoides melanotis *Temm.* Southern and Eastern Brazil.
Hæmophila sumichrasti *Lawr.* Western Mexico.
humeralis *Cab.* Mexico.
stolzmanni *Taczan.* Northern and Western Peru.
Pipilo mystacalis *Taczan.* Central Peru.
Pyrgisoma kieneri *Bp.* Mexico.
Chrysomitris atrata (*Lafr. et d'Orb.*). Bolivia and Peru.
spinescens *Bp.* Colombia.
atriceps *Salv.* Guatemala.
capitalis *Caban.* Central Peru.
Sycalis flaveola (*Linn.*). Columbia to South Brazil.
columbiana *Cab.* Venezuela, Guiana, and Lower Amazons.
luteola (*Sparm.*). Colombia to Chili and Argentine Republic.
chrysops *Scl.* Mexico and Guatemala.
lutea (*Lafr. et d'Orb.*). Bolivia and Peru.
luteocephala (*Lafr. et d'Orb.*). Bolivia.
uropygialis (*Lafr. et d'Orb.*). Bolivia.
raimondi *Jelski.* Western Peru.

### Family ICTERIDÆ.

Clypeicterus oseryi *Deville.* Upper Amazons.
Ostinops bifasciatus (*Spix*). Lower Amazons.
atrovirens (*Lafr. et d'Orb.*). Colombia and Amazons to Bolivia.
atrocastaneus *Caban.* Peru.
Cassicus chrysonotus *D'Orb. et Lafr.* Bolivia.
Icterus cayanensis (*Linn.*). Guiana.
maculi-alatus *Cassin.* Guatemala.
Molothrus purpurascens *Hahn.* Western Peru.
discolor (*Cassin*). Venezuela and Colombia.
Agelæus cyanopus (*Vieill.*). South Brazil and Paraguay.
Lampropsar guianensis (*Cab.*). Guiana and Venezuela.
warszewiezi *Cab.* Ecuador and Peru.
Quiscalus assimilis *Scl.* Veragua to Colombia.
lugubris *Sw.* Guiana and Trinidad.
subalaris *Boiss.* Colombia and Venezuela.

### Family CORVIDÆ.

Xanthura yncas cæruleocephala (*Dubois*). Venezuela and Trinidad.
Cyanolyca viridicyanea (*Lafr. et d'Orb.*). Bolivia and Peru.
jolyæa (*Bp.*). Peru.
armillata (*Gray*). Colombia and Venezuela.
meridana (*Scl. et Salv.*). Venezuela.
bogotana (*Scl. et Salv.*). Bogota.

Aphelocoma ultramarina (*Bp.*). Mexico.
Cyanocorax cayanus (*Linn.*). Guiana.
diesingi *Pelz.* Brazil.
sclateri *Heine.* Colombia.
intermedius *Heine.* Venezuela.
chilensis (*Bonap.*). Bolivia and Chili.
inexpectatus *Elliot.* Brazil.
heckeli *Pelz.* Brazil.
flavigastra (*Lath.*). Trinidad to Colombia; Guiana?
Cissolopha germana (*Scl. et Salv.*). Belize, Peten, and Merida (Yucatan).
Psilorhinus cyanogenys *Gray.* Coast of Honduras.
Corvus minutus *Gundl.* Cuba.
solitarius *Würt.* St. Domingo.

### Family OXYRHAMPHIDÆ.

Oxyrhamphus flammiceps (*Temm.*). Brazil.

### Family TYRANNIDÆ.

Conopophaga aurita (*Gm.*). Guiana.
torrida *Scl.* Eastern Ecuador.
peruviana *Des Murs.* Eastern Ecuador and Amazons.
gutturalis *Scl.* Colombia.
castaneiceps *Scl.* Peru and Colombia.
ardesiaca *Lafr. et d'Orb.* Bolivia and Upper Amazons.
melanogastra *Ménétr.* Interior of Brazil and Amazons.
maximiliani *Cab.* Southern Brazil (Rio).
Corythopis anthoides (*Puch.*). Guiana.
humivagans *Jelski.* Central Peru.
nigro-cincta (*D'Orb. et Lafr.*). Bolivia.
Agriornis pollens *Scl.* Ecuador.
solitaria *Scl.* Ecuador.
insolens *Scl. et Salv.* High Peru.
Myiotheretes erythropygia *Scl.* Ecuador.
Tænioptera velata *Licht.* Southern Brazil and Bolivia.
murina (*Lafr. et d'Orb.*). Patagonia.
rubetra *Burm.* Argentine Republic and Patagonia.
australis *Philippi.* Patagonia.
Ochthodiæta fumigata (*Boiss.*). High Colombia.
signatus *Taczan.* Central Peru.
fuscorufus *Scl. et Salv.* Bolivia and interior of Peru.
Ochthœca fumicolor *Scl.* Colombia and Ecuador.
superciliosa *Scl. et Salv.* High Venezuela.
œnanthoides (*Lafr. et d'Orb.*). High Bolivia.
polionota *Scl. et Salv.* High Peru.
leucophrys (*Lafr. et d'Orb.*). High Bolivia.

Ochthœca albidiema (*Lafr.*). Colombia.
rufipectoralis (*Lafr. et d'Orb.*). Bolivia.
rufimarginata *Lawr.* Ecuador and Colombia.
nigrita *Scl. et Salv.* Venezuela.
cinnamomeiventris (*Lafr.*). Colombia.
diadema (*Hartl.*). Colombia.
gratiosa *Scl.* Ecuador.
murina *Scl.* Guiana.
pulchella *Scl. et Salv.* Bolivia.
arenacea *Scl. et Salv.* Interior of Colombia.
salvini *Taczan.* Peru.
leucometopa *Scl. et Salv.* Western Peru.
thoracica *Jelski.* Central Peru.
poliogastra *Salv. et Godm.* High Colombia.
tænioptera (*Caban.*). Peru.
Sayornis latirostris *Cab.* Ecuador.
Fluvicola pica (*Bodd.*). Guiana.
climacura (*Vieill.*). Brazil.
atripennis *Scl.* Western Ecuador.
Cnipolegus nigerrimus (*Vieill.*). Brazil.
aterrimus *Kaup.* Bolivia.
anthracinus *Heine.* Argentine Republic (Mendoza).
unicolor *Kaup.* Upper Amazons.
hudsoni *Scl.* Patagonia.
pusillus *Scl. et Salv.* Amazons.
Muscisaxicola albifrons *Tsch.* Peru.
fluviatilis *Scl. et Salv.* Peru.
rufipennis *Jelski.* Central Peru.
Platyrhynchus rostratus (*Lath.*). Brazil.
flavigularis *Scl.* Colombia.
senex *Scl. et Salv.* Ecuador.
Todirostrum chrysocrotaphum *Strickl.* Amazons.
guttatum *Pclz.* Interior of Guiana and Colombia.
calopterum *Scl.* Eastern Ecuador.
picatum *Scl.* Eastern Ecuador.
capitale *Scl.* Eastern Ecuador.
pulchellum *Scl.* High Peru.
rufigene *Scl. et Salv.* Ecuador.
signatum *Scl. et Salv.* Amazons.
Euscarthmus nidipendulus (*Max.*). Brazil.
fumifrons (*Hartl.*). Brazil.
gularis (*Temm.*). Brazil.
grenadensis (*Hartl.*). Colombia.
striaticollis (*Lafr.*). Brazil.
impiger *Scl. et Salv.* Colombia and Venezuela.
wuchereri *Scl. et Salv.* Brazil.

Euscarthmus fulviceps *Scl.* Peru and Western Ecuador.
spicifer (*Lafr.*). Upper Amazons.
ocularis *Salv.* Western Ecuador.
rufigularis *Caban.* Western Peru.
pyrrhops *Caban.* Peru.
pelzelni *Scl. et Salv.* Brazil (Cuyuba).
Orchilus auricularis (*Vieill.*). Brazil.
ecaudatus (*Lafr. et d'Orb.*). Bolivia, Venezuela, and Costa Rica.
Colopterus galeatus (*Bodd.*). Guiana and Venezuela.
Hapalocercus acutipennis *Scl. et Salv.* Colombia and Peru.
Habrura minima (*Gould.*). Uruguay.
Pogonotriccus eximius (*Temm.*). Brazil.
ophthalmicus *Taczan.* Central Peru.
Leptotriccus sylviola *Cab.* Brazil.
superciliaris *Scl. et Salv.* Veragua.
Ceratotriccus furcatus (*Lafr*). Southeastern Brazil.
Stigmatura flavo-cinerea (*Burm.*). Argentine Republic.
Serpophaga subflava *Scl. et Salv.* Brazil (Para).
parvirostris *Gould.* Chili.
pœcilocerca *Scl. et Salv.* Ecuador and Colombia.
albogrisea *Scl. et Salv.* Ecuador.
Anæretes fernandezianus *Philippi.* Island of Juan Fernandez.
agilis *Scl.* Colombia.
flavirostris *Scl. et Salv.* Bolivia.
Leptopogon peruvianus *Scl. et Salv.* Upper Amazons.
erythrops *Scl.* Colombia.
pœcilotis *Scl.* Colombia.
auritus *Jelski.* Central Peru.
tristis *Scl. et Salv.* Bolivia.
minor *Taczan.* Northern Peru.
Phyllomyias brevirostris *Spix.* Brazil.
burmeisteri *Cab. et Hein.* Brazil.
semifusca *Scl.* Guiana to Colombia; Brazil.
platyrhyncha *Scl. et Salv.* Interior of Brazil.
tumbezana *Taczan.* North Peru.
cinereicapilla *Caban.* Western Peru.
Ornithion inerme *Hartl.* Guiana.
obsoletum (*Max.*). Brazil.
Tyranniscus cinereiceps *Scl.* Colombia and Ecuador.
chrysops *Scl.* Colombia and Ecuador.
improbus *Scl. et Salv.* Venezuela and Colombia.
leucogonys *Scl. et Salv.* Colombia.
gracilipes *Scl.* Eastern Peru and Upper Amazons.
griseiceps *Scl. et Salv.* Ecuador.
viridissimus *Scl.* Central Peru.

Tyranneutes brachyurus *Scl. et Salv.* British Guiana.
Elainea gigas *Scl.* Eastern Ecuador.
    pallatangæ *Scl.* Western Ecuador.
    fallax *Scl.* Jamaica.
    elegans *Pelz.* Amazons, Colombia, and Guiana.
    caniceps *Sw.* Amazons, Colombia, and Panama.
    ruficeps *Pelz.* Interior of Guiana and Amazons.
    obscura (*Lafr. et d'Orb.*). Brazil and Bolivia.
    mesoleuca *Cab. et Hein.* Brazil.
    arenarum *Salv.* Costa Rica.
    affinis *Burm.* Interior of Brazil.
    leucospodia *Taczan.* Northern Peru.
Sublegatus glaber *Scl. et Salv.* Venezuela.
    murinus (*Spix*). Lower Amazons.
Myiozetetes rufipennis *Lawr.* Venezuela.
    similis (*Spix*). Brazil, Peru, and Ecuador.
    luteiventris *Scl.* Eastern Ecuador, Upper Amazons, and Guiana.
Rhynchocyclus olivaceus (*Temm.*). Brazil.
    fulvipectus *Scl.* Western Ecuador.
    viridiceps *Scl. et Salv.* Upper Amazons.
    megacephalus *Sw.* Brazil and Amazons.
    peruvianus *Taczan.* Central Peru.
Conopias inornata (*Lawr.*). Venezuela and Trinidad.
    cinchoneti (*Tsch.*). Peru and Colombia.
Pitangus gabbi *Lawr.* St. Domingo.
Sirystes sibilator (*Vieill.*). Brazil.
    albogriseus *Lawr.* Panama, Colombia, and Amazons.
    albocinereus *Scl. et Salv.* Upper Amazons and Colombia.
Myiodynastes hemichrysus (*Cab.*). Veragua and Costa Rica.
Muscivora swainsoni *Pelz.* Eastern Brazil.
    castelnaudi (*Dev.*). Upper Amazons.
Hirundinea sclateri *Reinh.* Eastern Peru and Colombia.
Myiobius vieillotides (*Lafr.*). Venezuela.
    pulcher *Scl.* Ecuador.
    rufescens *Salv.* Western Peru.
    capitalis *Salv.* Costa Rica.
    aureiventris *Scl.* High Peru.
    superciliosus *Taczan.* Central Peru.
    stellatus *Caban.* Ecuador.
Empidochanes fringillaris *Pelz.* South Brazil.
    pœcilurus *Scl.* Colombia and Peru.
Mitrephorus ochraceiventris *Caban.* Western Peru.
Empidonax griseigularis *Lawr.* Panama and Western Ecuador.
    atriceps *Salvin.* Veragua.
    andinus *Taczan.* Central Peru.

Empidonax pectoralis *Lawr.* Central Mexico.
Contopus ardesiacus (*Lafr.*). Venezuela to Ecuador.
ochraceus *Scl. et Salv.* Costa Rica.
brachytarsus *Scl.* Mexico to Colombia; Amazons.
schotti *Lawr.* Yucatan.
Blacicus blancoi *Gundl.* Porto Rico.
Myiochanes cinereus (*Spix*). Brazil, Amazons, and Ecuador.
nigrescens *Scl. et Salv.* Ecuador.
Myiarchus magnirostris (*Gray*). Galapagos Island.
semirufus *Scl. et Salv.* Peru.
cephalotes *Stolzm.* Peru.
apicalis *Scl. et Salv.* Interior of Colombia.
Tyrannus niveigularis *Scl.* Western Ecuador.
albigularis *Burm.* Eastern Brazil.
aurantio-atro-cristatus *Lafr. et d'Orb.* Argentine Republic, Bolivia, and Eastern Peru.
apolites (*Cab. & Hein.*). (Hab. ignot).

### Family PIPRIDÆ.

Piprites pileatus (*Temm.*). Brazil.
chloris (*Temm.*). Brazil.
chlorion (*Cab.*). Guiana, Amazons, and Colombia.
griseiceps *Salv.* Costa Rica.
tschudii *Caban.* Peru.
Xenopipo atronitens *Cab.* Guiana and Colombia.
Pipra heterocerca *Scl.* Amazons.
flavicollis *Scl.* Amazons.
fasciata *Lafr.* Amazons, interior of Brazil, Peru, and Bolivia.
cornuta *Spix.* Upper Amazons.
nattereri *Scl.* Amazons.
cæruleocapilla *Tsch.* Peru.
virescens *Pelz.* Amazons.
Neopipo cinnamomea *Lawr.* Upper Amazons.
Machæropterus pyrocephalus *Scl.* Amazons and interior of Brazil.
Chiroxiphia regina *Scl.* Upper Amazons.
Metopothrix aurantiaca *Scl. et Salv.* Upper Amazons.
Chiromachæris coronata *Bouc.* Colombia.
Heteropelma turdinum (*Max.*). Brazil.
wallacei *Scl. et Salv.* Lower Amazons.
amazonum *Scl.* Upper Amazons and Colombia.
stenorhynchum *Scl. et Salv.* Venezuela.
virescens (*Max.*). Brazil.
flavicapillum *Scl.* Brazil.
chrysocephalum *Pelz.* Interior of Brazil and Amazons.
aurifrons (*Max.*). Brazil.

Heterocercus linteatus *Strickl.* Upper Amazons.
flavivertex *Pelz.* Interior of Guiana.
aurantiivertex *Scl. et Salv.* Ecuador.
Schiffornis major *Bp.* Upper Amazons.
rufa *Pelz.* Interior of Brazil.

### Family COTINGIDÆ.

Tityra inquisitor (*Olf.*). Brazil and Guiana.
inquisitrix *Scl. et Salv.* Bolivia.
Hadrostomus homochrous *Scl.* Western Ecuador and Panama.
audax *Caban.* Western Peru.
Pachyrhamphus surinamus (*Linn.*). Guiana.
spodiurus *Scl.* Western Ecuador.
niger *Spix.* Guiana, Amazons, Trinidad, and Colombia.
intermedius *Berlepsch.* Venezuela.
Lathria plumbea (*Licht.*). Brazil.
subalaris *Scl.* Upper Amazons.
cryptolopha *Scl. et Salv.* Western Ecuador.
Chirocylla uropygialis *Scl. et Salv.* Bolivia.
Aulia hypopyrrha (*Vieill.*). Brazil.
lateralis *Gray et Mitch.* Upper Amazons.
Lipaugus immundus *Scl. et Salv.* Interior of Guiana.
Ptilochloris squamata (*Max.*). Brazil.
buckleyi *Scl. et Salv.* Ecuador.
Attila brasiliensis *Less.* Brazil.
spadiceus (*Gm.*). Guiana.
citriniventris *Scl.* Upper Amazons.
validus *Pelz.* Interior of Brazil.
thamnophiloides (*Spix.*). Guiana and Upper Amazons.
Casiornis fusca *Scl. et Salv.* Brazil (Bahia).
Tijuca nigra *Less.* Brazil.
Pipreola melanolæma *Boiss.* Venezuela, Ecuador, and Peru.
aureipectus *Lafr.* Venezuela and Colombia.
chlorolepidota *Sw.* Western Ecuador.
sclateri *Corn.* Ecuador.
formosa *Hartl.* Venezuela.
viridis (*d'Orb. et Lafr.*). Bolivia and Peru.
lubomirskii *Taczan.* Northern Peru.
elegans *Scl.* Middle Peru.
frontalis *Scl.* Bolivia.
Ampelio melanocephalus *Sw.* Brazil.
Heliochera rufaxilla (*Tsch.*). Eastern Peru and Colombia.
Cotinga cincta (*Bodd.*). Eastern Brazil.
Xipholena lamellipennis (*Lafr.*). Lower Amazons.
Iodopleura laplacei *Eyd. et Gerv.* Guiana.

Doliornis sclateri *Taczan.* Central Peru.
Pyroderus orenocensis (*Lafr.*). Venezuela.
Cephalopterus penduliger *Scl.* Western Ecuador.
Phytotoma angustirostris *Lafr. et d'Orb.* Bolivia.

### Family DENDROCOLAPTIDÆ.

Geobates pœcilopterus (*Max.*). Southern Brazil.
Geositta crassirostris *Scl.* Western Peru.
fasciata (*Phil. et Landb.*). Chili.
peruviana *Lafr.* Western Peru.
saxicolina *Taczan.* Central Peru.
Furnarius agnatus *Scl. et Salv.* Colombia.
assimilis *Cab. et Hein.* Southern and Eastern Brazil.
minor *Pelz.* Amazons.
commersoni *Pelz.* Southern Brazil and Bolivia.
pileatus *Scl. et Salv.* Lower Amazons.
Clibanornis dendrocolaptoides (*Pelz.*). South Brazil.
Upucerthia ruficauda (*Meyen*). Chili and Argentine Republic.
luscinia (*Burm.*). Argentine Republic.
serrana *Taczan.* Central Peru.
jelskii (*Cab.*). Central Peru.
Cinclodes antarcticus (*Garn*). Falkland Islands.
bifasciatus *Scl.* Bolivia and Argentine Republic.
rivularis *Caban.* Central Peru.
Lochmias sororia *Scl. et Salv.* Venezuela.
obscurata *Cab.* Bolivia.
Sclerurus umbretta (*Licht.*). Brazil.
albigularis *Sw.* Venezuela.
olivascens *Caban.* Western Peru.
Oxyurus masafueræ (*Ph. et Landb.*). Masafuera Island.
Sylviorthorhynchus desmursi *Gay.* Chili.
Phlœocryptes schœnobænus *Cab.* Peru.
Leptasthenura setaria (*Temm.*) Southern Brazil.
striolata (*Pelz.*). Interior of Brazil.
andicola *Scl.* High Ecuador.
fuliginiceps (*Lafr. et d'Orb.*). Argentine Republic.
Synallaxis mæsta *Scl.* Ecuador and Colombia.
hypospodia *Scl.* Brazil.
subpudica *Scl.* Colombia.
guianensis (*Gm.*). Guiana, Colombia, and Lower Amazons.
albilora *Pelz.* Interior of Brazil and Bolivia.
cinerascens *Temm.* Brazil.
propinqua *Pelz.* Amazons.
stictothorax *Scl.* Ecuador.
semicinerea *Reich.* Brazil.

Synallaxis scutata *Scl.* Brazil.
vulpina *Pelz.* Interior of Brazil and Amazons.
unirufa *Lafr.* Colombia.
castanea *Scl.* Venezuela.
kollari *Pelz.* Interior of Guiana.
læmosticta *Scl.* Colombia.
terrestris *Jard.* Tobago and Trinidad.
gularis *Lafr.* Colombia and Ecuador.
fuliginosa *Lafr.* Colombia.
palpebralis *Cab.* Peru.
torquata (*Max.*). Southern Brazil.
maximiliani *d'Orb.* Bolivia.
rutilans *Temm.* Amazons.
brunneicaudalis *Scl.* Western Ecuador and Western Peru.
mustelina *Natt.* Eastern Peru and River Madeira.
fructicicola *Taczan.* Peru.
rufipennis *Scl. et Salv.* Bolivia.
maranonica *Tacz.* North Peru.
tithys *Taczan.* Peru.
pallida *Max.* Brazil.
antisiensis *Scl.* Ecuador.
curtata *Scl.* Colombia.
rufigenis *Lawr.* Costa Rica.
hyposticta *Pelz.* Interior of Guiana.
subcristata *Scl.* Venezuela.
ruticilla *Cab. et Hein.* Southern Brazil.
albiceps (*Lafr. et d'Orb.*). Bolivia.
albicapilla *Cab.* Peru.
humicola *Kittl.* Chili and Argentine Republic.
orbignyi *Reichenb.* Bolivia and Argentine Republic.
arequipæ *Scl. et Salv.* Western Peru.
humilis *Cab.* Western Peru.
patagonica (*Lafr. et d'Orb.*). Patagonia.
wyatti *Scl.* Colombia.
flammulata *Jard.* High Ecuador and Colombia.
pudibunda *Scl.* Central Peru.
graminicola *Jelski.* Central Peru.
virgata *Jelski.* Central Peru.
Placellodomus striaticeps (*Lafr. et d'Orb.*). Bolivia and Peru.
sibilator *Doring.* Argentine Republic (Cordova) and Bolivia.
Thripophaga guttuligera *Scl.* Colombia.
Homorus unirufus (*Lafr. et d'Orb.*). Bolivia.
gutturalis (*Lafr. et d'Orb.*). Bolivia and Argentine Republic.
Thripadectes flammulatus (*Eyt.*). Colombia.
scrutator *Jelski.* Central Peru.

Automolus ferruginolentus (*Max.*). Brazil.
- melanopezus *Scl.* Eastern Ecuador.
- sclateri *Pelz.* Amazons.
- subulatus (*Spix*). Amazons.
- holostictus *Scl. et Salv.* Colombia.
- striaticeps *Scl. et Salv.* Interior of Colombia and Peru.
- ignobilis *Scl. et Salv.* Colombia.
- dorsalis *Scl. et Salv.* Ecuador.
- stictoptilus *Caban.* Western Peru.

Philydor panerythrus *Scl.* Colombia.
- columbianus *Cab.* Venezuela and Colombia.
- erythropterus *Scl.* Colombia.
- fuscipennis *Salv.* Veragua.
- erythronotus *Scl. et Salv.* Colombia.
- consobrinus *Scl.* Colombia.
- ruficaudatus (*Lafr. et d'Orb.*) Colombia to Bolivia.
- subfulvus (*Scl.*). Ecuador.
- erythrocercus (*Pelz.*). Guiana and Amazons.
- striaticollis *Scl.* Colombia.
- amaurotis (*Temm.*). Brazil.
- subflavescens *Caban.* Western Peru.

Heliobletus superciliosus (*Licht.*). Brazil.

Anabazenops temporalis *Scl.* Colombia and Western Ecuador.
- subalaris *Scl.* Veragua to Western Ecuador.
- guttulatus *Scl.* Venezuela.
- cabanisi *Taczan.* Central Peru.

Xenops heterurus *Cab. et Hein.* Colombia and Eastern Peru.

Sittasomus stictolæmus *Pelz.* Upper Amazons.

Margarornis stellata *Scl. et Salv.* Ecuador.

Dendrocincla ruficeps *Scl. et Salv.* Panama.
- meruloides (*Lafr.*). Venezuela.
- fumigata (*Licht.*). Brazil.
- longicauda *Pelz.* Amazons.
- tyrannina (*Lafr.*). Colombia.

Dendrocolaptes puncticollis *Scl. et Salv.* Guatemala and Costa Rica.
- validus (*Tsch.*). Guiana, Peru, and Colombia.
- radiolatus *Scl. et Salv.* Peru.
- concolor *Pelz.* Amazons.

Nasica longirostris (*Licht.*). Guiana.

Drymornis bridgesi *Eyton.* Argentine Republic.

Xiphocolaptes promeropirhynchus (*Less.*). Colombia to Peru and Bolivia.
- procerus *Cab. et Hein.* Venezuela.

Dendrexetastes temmincki (*Lafr.*). Guiana.
- perrotti (*Lafr.*). Guiana.

Dendrornis guttata (*Licht.*). Brazil.

Dendrornis rostripallens *Des Murs.* Amazons and Colombia.
eytoni *Scl.* Lower Amazons.
elegans *Pelz.* Amazons and Colombia.
spixi *Less.* Lower Amazons.
multiguttata (*Lafr.*). Guiana and Amazons.
Picolaptes squamatus (*Licht.*). Brazil.
falcinellus (*Cab.*). Interior of Brazil.
albolineatus (*Lafr.*). Colombia and Venezuela.
puncticeps *Scl. et Salv.* Guiana.
souleyeti (*Des Murs*). Western Ecuador.
fuscicapillus *Pelz.* Interior of Brazil.
layardi *Scl.* Brazil (Para).
Xiphorhynchus pusillus *Scl.* Colombia and Veragua.
pucherani *Lafr.* Colombia.
lafresnayanus (*d'Orb.*). Bolivia.

## Family FORMICARIIDÆ.

Thamnophilus undulatus *Pelz.* Amazons.
fuliginosus *Gould.* Guiana.
guttatus *Vieill.* South Brazil.
borbæ *Pelz.* Madeira River.
melanurus *Gould.* Upper Amazons and Colombia.
leuconotus *Spix.* Upper Amazons.
plumbeus *Scl.* Upper Amazons.
cinereo-niger *Pelz.* Amazons.
stellaris *Spix.* Guiana and Amazons.
tristis *Scl. et Salv.* Guiana.
simplex *Scl.* Brazil (Para).
immaculatus *Lafr.* Amazons; Colombia to Costa Rica.
tschudii *Pelz.* Amazons.
æthiops *Scl.* Upper Amazons.
nigriceps *Scl.* Colombia.
nigrocinereus *Scl.* Lower Amazons.
cinereinucha *Pelz.* Amazons.
cinereiceps *Pelz.* Guiana and Amazons.
capitalis *Scl.* Upper Amazons.
murinus *Pelz.* Guiana and Amazons.
cristatus *Max.* Brazil.
capistratus *Less.* South and East Brazil.
albicans *Lafr.* Colombia.
multistriatus *Lafr.* Colombia.
tenuipunctatus *Lafr.* Colombia and Ecuador.
melanochrous *Scl. et Salv.* High Peru.
subfasciatus *Scl. et Salv.* Bolivia.
Thamnistes æquatorialis *Scl.* Ecuador.
rufescens *Caban.* Western Peru.

Neoctantes niger (*Pelz.*). Amazons.
Clytoctantes alixii *Elliot.* Eastern Ecuador.
Dysithamnus guttulatus (*Licht.*). Brazil and Bolivia.
  olivaceus (*Tsch.*). Peru and Bolivia.
  xanthopterus *Burm.* Brazil.
  schistaceus *d'Orb.* Bolivia and Eastern Peru.
  ardesiacus *Scl. et Salv.* Eastern Ecuador.
  unicolor *Scl.* Ecuador and Colombia.
  plumbeus *Max.* Brazil and Lower Amazons.
  semiplumbeus *Scl. et Salv.* Ecuador.
Herpsilochmus pectoralis *Scl.* Bahia.
  atricapillus *Pelz.* Interior of Brazil.
  motacilloides *Jelski.* Central Peru.
  frater *Scl. et Salv.* Ecuador.
Myrmotherula multo-striata *Scl.* Amazons.
  guttata (*Vieill.*). Guiana.
  hæmatonota *Scl.* Upper Amazons.
  pyrrhonota *Scl. et Salv.* Guiana.
  erythrura *Scl.* Colombia.
  erythronota *Hartl.* Brazil.
  hauxwelli *Scl.* Upper Amazons.
  axillaris (*Vieill.*). Guiana and Colombia.
  urosticta *Scl.* Brazil.
  brevicauda (*Sw.*). Brazil.
  unicolor *Ménétr.* Colombia and Brazil.
  cinereiventris *Scl.* Guiana, Amazons, and Colombia.
  atrogularis *Taczan.* Central Peru.
  spodionota *Scl. et Salv.* Ecuador.
  gutturalis *Scl. et Salv.* British Guiana.
Formicivora strigilata (*Spix*). Brazil.
  erythrocerca *Scl.* Brazil.
  malura *Temm.* Brazil.
  consobrina *Scl.* Western Ecuador.
  bicolor *Pelz.* Upper Amazons.
  speciosa *Salv.* Western Ecuador (Puna Island).
Terenura callinota *Scl.* Colombia and Veragua.
  caloptera *Scl.* Western Ecuador.
  humeralis *Scl. et Salv.* Eastern Ecuador.
  spodioptila *Scl. et Salv.* British Guiana.
Psilorhamphus guttatus (*Max.*). Interior of Brazil.
Microbates torquatus *Scl. et Salv.* Guiana.
Ramphocænus melanurus *Vieill.* Brazil, Guiana, and Venezuela.
  cinereiventris *Scl.* Interior of Colombia.
Cercomacra cærulescens *Vieill.* Eastern Brazil.
  cinerascens *Scl.* Guiana and Amazons.
  napensis *Scl.* Guiana and Eastern Ecuador.

Cercomacra approximans *Pelz.* Interior of Brazil.
carbonaria *Scl. et Salv.* Amazons.
nigricans *Scl.* Panama to Western Ecuador.
melanaria (*Ménétr.*). South Brazil.
Pyriglena atra *Sw.* Brazil.
picea *Cab.* Peru and Ecuador.
serva *Scl.* Ecuador and Amazons.
Gymnocichla chiroleuca *Scl. et Salv.* Honduras and Costa Rica.
Percnostola funebris (*Licht.*). Guiana.
minor *Pelz.* Interior of Guiana.
fortis *Scl. et Salv.* Upper Amazons.
Heterocnemis nævia (*Gm.*). Guiana.
simplex *Scl.* Guiana.
argentata (*Des Murs*). Upper Amazons.
Myrmeciza ruficauda (*Max.*). Brazil.
squamosa *Pelz.* Brazil.
atrothorax (*Bodd.*). Guiana, Amazons, interior of Brazil, and Bolivia.
ruficauda (*Pelz.*). Interior of Guiana.
hemimelæna *Scl. et Salv.* Amazons and Bolivia.
læmosticta *Salv.* Costa Rica and Veragua.
Hypocnemis flavescens *Scl.* Interior of Guiana.
hypoxantha *Scl.* Amazons.
pœcilonota *Puch.* Upper Amazons and Colombia.
lugubris *Pelz.* Amazons.
melanura *Scl. et Salv.* Upper Amazons.
melanopogon *Scl.* Guiana and Amazons.
maculicauda *Pelz.* Interior of Brazil.
hemileuca *Scl. et Salv.* Upper Amazons.
nævia (*Gm.*). Guiana and Upper Amazons.
theresæ (*Des Murs.*). Upper Amazons.
lepidonota *Scl. et Salv.* Eastern Ecuador.
stellata *Scl. et Salv.* Eastern Ecuador.
subflava *Cuban.* Western Peru.
Pithys lunulata *Scl. et Salv.* Upper Amazons.
melanosticta *Scl. et Salv.* Eastern Ecuador.
Phlogopsis nigromaculata (*Lafr. et d'Orb.*). Bolivia, Ecuador, and Upper Amazons.
erythroptera *Gould.* Interior of Guiana.
trivittata *Scl.* Upper Amazons.
Formicarius analis (*Lafr. et. d'Orb.*). Bolivia, Ecuador, Panama, Costa Rica.
rufipectus *Salv.* Veragua.
Chamæza nobilis *Gould.* Upper Amazons.
mollissima *Scl.* Colombia.
Grallaria varia (*Bodd.*). Guiana and Venezuela.

Grallaria imperator (*Lafr.*). Brazil.
regulus *Scl.* Western Ecuador.
princeps *Scl. et Salv.* Veragua.
mexicana *Scl.* Southern Mexico.
griseonucha *Scl. et Salv.* Venezuela.
hypoleuca *Scl.* Colombia.
modesta *Scl.* Colombia.
brevicauda (*Bodd.*). Guiana, Amazons, and Eastern Ecuador.
macularia *Temm.* Guiana.
ochroleuca (*Max.*). Brazil.
fulviventris *Scl.* Eastern Ecuador.
haplonota *Scl.* Venezuela.
ruficeps *Scl.* Colombia.
flavotincta *Scl.* Colombia.
erythroleuca *Scl.* High Peru.
erythrotis *Scl. et Salv.* Bolivia.
andicola *Cab.* Central Peru.
rufocinerea *Scl. et Salv.* Colombia.
albiloris *Taczan.* Northern Peru.
dignissima *Scl. et Salv.* Eastern Ecuador.
Grallaricula loricata *Scl.* Venezuela.
ferrugineipectus *Scl.* Venezuela.
nana (*Lafr.*). Colombia.
cucullata (*Scl.*). Colombia.

## Family PTEROPTOCHIDÆ.

Scytalopus fuscoides *Lafr.* Chili.
senilis *Lafr.* Colombia.
sylvestris *Jelski.* Central Peru.
speluncæ *Ménétr.* Southern Brazil.
Merulaxis rhinolophus (*Max.*). Interior of Brazil.
Rhinocrypta lanceolata (*Geoffr. et d'Orb.*). Patagonia and Argentine Republic.
fusca *Scl. et Salv.* Argentine Republic.
Liosceles thoracius *Scl.* Interior of Brazil.

## Family TROCHILIDÆ.

Eutoxeres heterura *Gould.* Ecuador.
condaminei (*Bourc.*) *Gould.* Ecuador.
Androdon æquatorialis *Gould.* Ecuador.
Glaucis dorhni (*Bourc.*) *Gould.* Brazil.
antoniæ (*Bourc. & Muls.*) *Muls.* Guiana.
leucurus (*Linn.*) *Bon.* Guiana.
Doleromya fallax (*Bourc.*) *Bon.* Venezuela.
Phaëthornis bourcieri (*Less.*) *Gray.* Peru.
philippii (*Bourc.*) *Gray.* Bolivia.
guyi (*Less.*) *Gray.* Trinidad, Venezuela, and Eastern Peru.
idaliæ (*Bourc. et Muls.*) *Elliot.* South Brazil.

Phaëthornis pygmæus (*Spix*) *Gould.* Guiana and Brazil.
episcopus *Gould.* Guiana.
nigricintus *Lawr.* Upper Amazons, Peru, and Brazil.
Campylopterus hyperythrus *Cab.* Guiana.
cuvieri (*Delattr. et Bourc.*) *Bon.* Costa Rica to Colombia; Venezuela.
phainopeplus *Salv.* Sierra Nevada de Sta Marta, Colombia.
Aphantochroa gularis *Gould.* Ecuador.
hyposticta *Gould.* Ecuador.
Oreopyra cinereicauda *Lawr.* Costa Rica.
Oreotrochilus melanogaster *Gould.* Peru.
adelæ (*D'Orb. et Lafr.*) *Gould.* Bolivia.
Lampornis veraguensis *Gould.* Veragua.
calosoma *Elliot.* (Hab. ignot.) ?
Chalybura urochrysea (*Gould*) *Muls.* Panama.
Petasophora corruscans *Gould.* Colombia ?
rubrigularis *Elliot.* (Hab. ignot).
Phæolæma æquatorialis *Gould.* Ecuador.
Iolæma luminosa *Elliot.* (Hab. ignot.) ?
whitelyana *Gould.* Peru.
Sternoclyta cyaneipectus *Gould.* Venezuela.
Urochroa bougueri (*Bourc.*) *Gould.* Ecuador.
Lampraster branickii *Taczan.* Peru.
Diphlogæna iris *Gould.* Bolivia.
hesperus *Gould.* Ecuador.
Helianthea isaacsoni (*Parz.*) *Elliot.* (Hab. ignot).
eos *Gould.* Venezuela.
violifera *Gould.* Bolivia.
osculans *Gould.* Peru.
dichroura *Taczan.* Peru.
Bourcieria inca *Gould.* Peru and Bolivia.
conradi *Gould.* Venezuela.
insectivora *Gould.* Peru.
traviesi (*Muls. et Verr.*) *Elliot.* Colombia.
purpurea (*Gould*) *Elliot.* Colombia.
assimilis *Elliot.* Ecuador ?
boliviana (*Gould*) *Elliot.* Bolivia.
Hemistephania euphrosinæ (*Muls. et Verr.*) *Elliot.* Ecuador ?
Floricola albicrissa (*Gould*) *Elliot.* Ecuador ?
Heliotrypha viola *Gould.* Ecuador.
micrastur (*Gould*) *Elliot.* Ecuador.
barrali *Muls. et Verr.* Colombia.
Heliangelus spencei (*Bourc.*) *Bon.* Venezuela.
amethysticollis (*d'Orb. et Lafr.*) *Bon.* Peru and Bolivia.
mavors *Gould.* Colombia and Venezuela.
Urosticle ruficrissa *Lawr.* Ecuador.

Eustephanus fernandensis (*King*) *Reich.* Island of Juan Fernandez.
leyboldi *Gould.* Island of Mas-a-fuera.
Topaza pyra (*Gould*) *Gray.* Rio Negro.
Hylonympha macrocera *Gould.* Northern Brazil.
Thalurania jelskii *Taczan.* Peru.
watertoni (*Bourc.*) *Bon.* Guiana.
refulgens *Gould.* Trinidad.
hypochlora *Gould.* Ecuador.
Microchera albocoronata (*Lawr.*) *Gould.* Veragua.
Selasphorus floresii *Gould.* Mexico.
torridus *Salv.* Veragua and Chiriqui.
Catharma orthura (*Less.*) *Elliot.* Guiana and Venezuela.
Rhodopis vesper (*Less.*) *Gould.* Peru.
atacamensis *Leyb.* Chili.
Calothorax pulchra *Gould.* Mexico.
Acestrura decorata *Gould.* Colombia?
micrura *Gould.* Bolivia.
Chætocercus jourdani (*Bourc.*) *Gray.* Trinidad.
rosæ (*Bourc. et Muls.*) *Cab. & Hein.* Venezuela.
bombus *Gould.* Ecuador.
Thaumastura cora (*Less. et Garn.*) *Bon.* Peru.
Myrtis yarrelli *Bourc.* Bolivia.
Smaragdochrysis iridescens *Gould.* Brazil.
Ptochoptera iolæma (*Reich.*) *Elliot.* Brazil.
Calliphlox mitchelli (*Bourc.*) *Gould.* Ecuador.
Lophornis regulus *Gould.* Bolivia.
gouldi (*Less.*) *Gould.* Lower Amazons.
adorabilis *Salv.* Chiriqui.
Popelaria laetitiæ (*Bourc.*) *Ridgw.* Bolivia?
Discura longicauda (*Gmel.*) *Reich.* Guiana and Brazil.
Steganura solstitialis *Gould.* Ecuador.
peruana (*Gould*) *Reich.* Peru.
addæ (*Bourc.*) *Reich.* Bolivia.
cissiura (*Gould*) *Cab. et Heine.* Peru.
Loddigesia mirabilis (*Bourc.*) *Gould.* Peru.
Lesbia nuna (*Less.*) *Gould.* Peru.
eucharis (*Bourc.*) *Reich.* Colombia.
Zodalia ortoni (*Lawr.*) *Muls.* Ecuador.
glyceria (*Bon.*) *Elliot.* Colombia.
Cynanthus mocoa (*Delatt. et Bourc.*) *Bon.* Ecuador, Peru, and Bolivia.
Sappho sparganura (*Shaw*) *Reich.* Bolivia and Argentine Republic.
phaon (*Gould*) *Reich.* Bolivia and Peru.
caroli (*Bourc.*) *Elliot.* Peru.
Oxypogon lindeni (*Parz.*) *Gould.* Venezuela.
cyanolæmus *Salv. et Godm.* Colombia (prov. Sta. Marta).
Oreonympha nobilis *Gould.* Peru.

Ramphomicron ruficeps (*Gould*) *Bon.* Peru and Bolivia.
dorsale *Salv. et Godm.* Colombia (prov. Sta. Marta).
Avocettula recurvirostris (*Swains.*) *Reich.* Guiana.
Metallura opaca (*Tsch.*) *Cab. et Heine.* Peru and Bolivia.
jelski *Cab.* Peru.
chloropogon (*Cab. et Heine.*) *Elliot.* (Hab. ignot.)
eupogon *Cab.* Peru.
æneicauda (*Gould*) *Bon.* Peru and Bolivia.
primolina *Bourc.* Ecuador.
williami (*Bourc. et Delatt.*) *Bon.* Colombia.
smaragdinicollis (*D'Orb. et Lafr.*) *Bon.* Peru and Bolivia.
Augastes lumachellus (*Less.*) *Bon.* Brazil.
superbus (*Vieill.*) *Bon.* Brazil.
Phlogophilus hemileucurus *Gould.* Ecuador.
Schistes personatus *Gould.* Ecuador.
Adelomyia inornata *Gould.* Peru and Bolivia.
chlorospila *Gould.* Peru.
Anthocephala floriceps (*Gould*) *Cab. et Heine.* Colombia.
Aglæactis castelnaudi (*Bourc. et Muls.*) *Gould.* Peru.
pamela (*D'Orb. et Lafr.*) *Gould.* Bolivia.
Eriocnemis assimilis *Elliot.* Bolivia.
squamata *Gould.* Ecuador.
mosquera (*Bourc. et Delattr.*) *Reich.* Colombia.
glaucopoides (*D'Orb. et Lafr.*) *Elliot.* Bolivia.
sapphiropygia *Taczan.* Peru.
chrysorama *Elliot.* Ecuador.
godini (*Bourc.*) *Reich.* Ecuador.
smaragdinipectus *Gould.* Ecuador.
nigrivestis (*Bourc. et Muls.*) *Reich.* Ecuador.
dyselius *Elliot.* Ecuador.
Uranomitra microrhyncha *Elliot.* Honduras?
cyanicollis (*Gould*) *Reich.* Peru.
Agyrtria viridiceps *Gould.* Ecuador.
norrisi (*Bourc.*) *Elliot.* Mexico.
compsa *Hein.* Guiana.
neglecta *Elliot.* Bolivia.
bartletti *Gould.* Eastern Peru.
nitidifrons *Gould.* Venezuela?
cæruliceps *Gould.* Colombia.
tobaci (*Gmel.*) *Elliot.* Tobago, Trinidad, Venezuela, Guiana, and Brazil.
apicalis (*Gould*) *Hein.* Colombia.
maculicauda (*Gould*) *Heine.* Guiana.
luciæ *Lawr.* Honduras.
nigricauda *Elliot.* Trinidad, Guiana, and Northeastern Brazil.

Agyrtria nitidicauda *Elliot.* Guiana.
taczanowskii *Scl.* Peru (prov. Cajamarca).
pelzelni *Taczan.* Upper Amazons (Guajango).
Arinia boucardi *Muls.* Costa Rica.
Eupherusa poliocerca *Elliot.* Mexico.
Polytmus leucorrhous *Scl. et Salv.* Brazil and Peru.
Amazilia pristina *Gould.* Ecuador and Peru.
leucophæa *Reich.* Peru.
alticola *Gould.* Ecuador.
ocai *Gould.* Mexico.
iodura (*Sauc.*) *Elliot.* Colombia.
lucida *Elliot.* Colombia.
feliciæ (*Less.*) *Elliot.* Venezuela.
warszewiczi (*Cab. & Hein.*) *Elliot.* Colombia.
saucerottii (*Bourc. et Delatt.*) *Elliot.* Colombia.
elegans (*Gould*) *Elliot.* (Hab. ignot.)
Eucephala smaragdo-cærulea *Gould.* Brazil.
cæruleo-lavata *Gould.* Brazil.
scapulata *Gould.* Guiana?
hypocyanea *Gould.* Brazil?
subcærulea *Elliot.* Brazil?
chlorocephala (*Bourc.*) *Gould.* Ecuador.
cyanogenys (*Prinz.*) *Gould.* Brazil.
Timolia lerchi (*Muls. et Verr.*) *Muls.* Colombia.
Iache magica (*Muls. et Verr.*) *Elliot.* Mexico.
Hylocharis lactea (*Less.*) *Gray.* Brazil.
viridiventris *Berlepsch.* Trinidad and Venezuela.
Chlorostilbon auriceps *Gould.* Northwestern Mexico.
Panychlora aliciæ (*Bourc. et Muls.*) *Cab. et Hein.* Venezuela.
stenura *Cab.* et *Heine.* Venezuela.

### Family CYPSELIDÆ.

Cypselus squamatus *Cass.* Guiana and Amazons.
andicola *Lafr. et d'Orb.* Bolivia and Peru.
Panyptila cayanensis (*Gm.*). Guiana.
Hemiprocne biscutata (*Scl.*). Southern and Eastern Brazil.
Chætura cinereicauda *Cass.* Brazil.
cinereiventris *Scl.* Brazil.
sclateri *Pelzeln.* Upper Amazons.
spinicauda (*Temm.*). Guiana.
fumosa *Salv.* Veragua and Colombia.
Cypseloides senex (*Temm.*). Brazil.
fumigatus (*Streubel*). Brazil and Peru.

### Family CAPRIMULGIDÆ.

Nyctibius longicaudatus (*Spix*). Upper Amazons.
leucopterus (*Max.*). Brazil.

Nyctibius bracteatus *Gould.* Guiana.
Lurocalis semitorquatus (*Gm.*). Guiana and Amazons.
nattereri (*Temm.*). Brazil.
Chordeiles pusillus *Gould.* Brazil.
Nyctiprogne leucopygia (*Spix*). Amazons and Brazil.
Antrostomus sericeo-caudatus *Cass.* South America.
nigrescens *Cab.* Guiana, Amazons, and Colombia.
maculicaudus (*Lawr.*). Bolivia and Peru.
Stenopsis cayennensis (*Gm.*). Guiana, Tobago, Martinique, and Colombia.
ruficervix *Scl.* Colombia and Ecuador.
æquicaudata (*Peale*). Western Peru.
Hydropsalis trifurcata *Natt.* Upper Amazons.
furcifera (*Vieill.*). Interior of Brazil, Paraguay, Bolivia, and Argentine Republic.
lyra *Bp.* Colombia and Venezuela.
segmentata *Cassin.* Colombia and Ecuador.
Heleothreptus anomalus (*Gould*). Interior of Brazil.
Steatornis caripensis *Humb.* Colombia, Venezuela, and Trinidad.

### Family PICIDÆ.

Picumnus rufiventris *Bp.* Upper Amazons.
cinnamomeus *Wagl.* Coasts of Venezuela and Colombia.
castelnaudi *Malh.* Eastern Peru.
leucogaster *Pelz.* Interior of Guiana.
minutus (*Linn.*). Brazil.
aurifrons *Pelz.* Upper Amazons.
cirrhatus *Temm.* Brazil.
lepidotus *Cab. et Hein.* Guiana.
squamatulus *Lafr.* Colombia and Venezuela.
albo-squamatus *Lafr. et d'Orb.* Bolivia.
sclateri *Taczan.* Western and Northern Peru.
micromegas *Sund.* Brazil?
lawrencei *Cory.* Haiti.
Campephilus imperialis *Gould.* Western Mexico.
sclateri *Malh.* Western Ecuador.
trachelopyrus (*Malh.*). Amazons.
Hylotomus galeatus (*Temm.*). South Brazil.
Chloronerpes sanguinolentus *Scl.* Honduras.
sedulus (*Cab. et Heine.*). Guiana.
ruficeps (*Spix*). Lower Amazons and interior of Brazil.
hilaris (*Cab. et Heine.*). Upper Amazons.
tænionotus (*Reich.*). Brazil.
malherbei *Scl.* Bolivia and Ecuador.
simplex *Salvin.* Chiriqui.
capistratus (*Malh.*). Interior of Guiana and Upper Amazons.

Chloronerpes leucolæmus (*Malh.*). Interior of Brazil.
dignus *Scl. et Salv.* Colombia.
callopterus *Lawr.* Panama.
xanthochlorus *Scl. et Salv.* Venezuela.
Chrysoptilus speciosus *Scl.* Upper Amazons.
icteromelas (*Vieill.*). Interior of Brazil.
cristatus (*Vieill.*). Argentine Republic.
atricollis (*Malh.*). Western Peru.
Melanerpes pulcher *Scl.* Colombia.
Centurus hypopolius (*Wagl.*). Mexico.
terricolor *Berlepsch.* "Orinoco district, or Trinidad."
rubriventris *Swains.* Yucatan?
Hypoxanthus atriceps *Scl. et Salv.* High regions of Peru and Bolivia.
brevirostris *Taczan.* Central Peru.
Colaptes stolzmanni *Taczan.* North Peru.
leucofrenatus v. *Martens.* Argentine Republic (Mendoza).
Celeus torquatus (*Bodd.*). Guiana.
elegans (*Müll.*). Guiana.
reichenbachi (*Malh.*). Venezuela and Trinidad.
flavus (*Müll.*). Guiana, Venezuela, and Amazons.
citreopygius *Scl. et Salv.* Upper Amazons.
grammicus (*Malh.*). Guiana and Upper Amazons.
multi-fasciatus (*Malh.*). Amazons.
subflavus *Scl. et Salv.* Brazil (Bahia).
immaculatus *Berlepsch.* Panama (?).
spectabilis *Scl. et Salv.* Eastern Ecuador.

### Family MOMOTIDÆ.

Momotus nattereri *Scl.* Interior of Brazil and Bolivia.
castaneiceps *Gould.* Guatemala.
Baryphthengus ruficapillus (*Vieill.*). Brazil and Paraguay.

### Family TODIDÆ.

Todus pulcherrimus *Sharpe.* Jamaica (?).

### Family ALCEDINIDÆ.

Ceryle stellata (*Meyen.*). Chili and Patagonia.

### Family TROGONIDÆ.

Trogon chionurus *Scl. et Salv.* Panama.
aurantius *Spix.* Brazil.
Euptilotis neoxenus (*Gould*). Mexico.
Pharomacrus fulgidus (*Gould*). Colombia and Venezuela.
pavoninus (*Spix*). Upper Amazons.
heliactin *Cab. et Heine.* Eastern Ecuador.
xanthogaster *Turati et Salvad.* Colombia.

### Family GALBULIDÆ.

Galbula cyaneicollis *Cassin.* Lower Amazons.
leucogastra *Vieill.* Guiana.
chalcothorax *Scl.* Eastern Ecuador.
tombacea cyanescens (*Dev.*). Amazons.
tombacea fuscicapilla (*Scl.*). Colombia.
albirostris chalcocephala (*Dev.*). Eastern Peru.
Urogalba amazonum *Scl.* Lower Amazons.
Brachygalba gœringi *Scl. et Salv.* Venezuela.
albigularis (*Spix*). Upper Amazons.
melanosterna (*Scl.*). Interior of Brazil and Bolivia.
salmoni *Scl. et Salv.* Colombia.
Jacamaralcyon tridactyla (*Pall.*). Brazil.
Jacamerops isidorei *Dev.* Upper Amazons.
Galbalcyrhynchus leucotis *Des Murs.* Upper Amazons.

### Family BUCCONIDÆ.

Bucco pectoralis *Gray.* Panama.
ordi *Cass.* Interior of Guiana and Venezuela.
tectus (*Bodd.*). Guiana.
picatus *Scl.* Upper Amazons.
pulmentum *Bp.* Upper Amazons.
striolatus *Pelz.* Interior of Brazil.
lanceolatus *Deville.* Peru and Eastern Ecuador.
macrorhynchus napensis (*Scl.*) Eastern Ecuador.
Malacoptila fusca (*Gm.*). Guiana, Upper Amazons, and Colombia.
rufa (*Spix*). Upper Amazons.
castanea *Verreaux.* Ecuador.
fulvogularis *Scl.* Bolivia and Peru.
substriata *Scl.* Colombia.
aspera *Scl.* Venezuela.
Nonnula rubecula (*Spix*). Lower Amazons.
ruficapilla (*Tsch.*). Upper Amazons.
Monasa morpheus (*Hahn.*). Brazil.
Chelidoptera brasiliensis *Scl.* Brazil.

### Family CUCULIDÆ.

Neomorphus geoffroyi (*Temm.*). Brazil.
salvini *Scl.* Nicaragua to Colombia.
pucherani *Deville.* Upper Amazons.
rufipennis *Gray.* Guiana.
radiolosus *Scl. et Salv.* Ecuador.
Dromococcyx phasianellus mexicanus (*Bp.*). Mexico and Guatemala.
Diplopterus nævius (?) chochi (*Vieill.*). South Brazil and Paraguay.
(?) lessoni (*Bp.*). (Hab. ignot.)

Hyetornis pluvialis rufigularis "*Herz. v Wurtemb.*" St. Domingo.
Piaya cayana nigricrissa (*Scl.*). Ecuador, Chiriqui.
Coccygus ferrugineus *Gould.* Cocos Island.
lindeni *Allen.* Lower Amazons.
euleri *Caban.* Southeastern Brazil.

### Family RHAMPHASTIDÆ.

Rhamphastos inca *Gould.* Bolivia and Peru.
citreolæmus *Gould.* Colombia.
osculans *Gould.* Interior of Guiana and Lower Amazons.
culminatus *Gould.* Upper Amazons.
Pteroglossus wiedi *Sturm.* Brazil.
erythropygius *Gould.* Nicaragua.
inscriptus *Wagler.* Lower Amazons and interior of Brazil.
beauharnaisi *Wagl.* Upper Amazons.
sturmi *Natt.* Banks of Madeira River.
azaræ (*Vieill.*). Interior of Guiana.
Selenidera gouldi (*Natt.*). Lower Amazons.
nattereri (*Gould*). Interior of Guiana.
reinwardti (*Wagl.*). Eastern Ecuador.
Andigena laminirostris *Gould.* Western Ecuador.
hypoglaucus (*Gould*). Ecuador and Peru.
cucullatus (*Gould*). Bolivia.
Aulacorhamphus sulcatus *Sw.* Venezuela.
derbianus (*Gould*). Ecuador and Bolivia.
atrogularis (*Sturm*). Peru.
cyanolæmus *Gould.* Ecuador.

### Family CAPITONIDÆ.

Capito quinticolor *Elliot.* Colombia.
versicolor (*Müll.*). Upper Amazons.
aurantiicollis *Scl.* Upper Amazons.
squamatus *Salv.* Western Ecuador.

### Family PSITTACIDÆ.

Ara hyacinthina (*Lath.*). Interior of Brazil.
spixi (*Wagl.*). Brazil.
rubrigenis *Lafr.* Bolivia.
tricolor (*Bechst.*). Cuba.
caninde (*Wagl.*). Paraguay.
hahni (*Souancé*). Guiana, Venezuela, and Amazons.
leari (*Bp.*). Brazil?
couloni *Scl.* High Eastern Peru.
Rhynchopsitta pachyrhyncha (*Sw.*). Mexico.

Conurus icterotis (*Mass. et Souancé*). Colombia.
haemorrhous (*Spix*). Brazil.
luteus (*Bodd.*). Lower Amazons.
wagleri *Gray*. Venezuela and Colombia.
solstitialis (*Linn.*). Guiana and Amazons.
jendaya (*Gm.*). Brazil.
æruginosus (*Linn.*). Venezuela and interior of Guiana.
cactorum (*Max.*). Brazil.
devillei *Mass. et Souancé*. Bolivia.
roseifrons *G. R. Gray*. Upper Amazons.
rhodocephalus *Scl. et Salv.* High Venezuela.
luciani *Deville*. Upper Amazons.
perlatus (*Spix*). Lower Amazons.
molinæ *Mass. et Souancé*. Interior of Brazil.
rhodogaster *Scl.* Banks of the Madeira.
hæmatotis (*Souancé*). Venezuela.
melanurus *Spix*. Interior of Guiana.
souancæi *Verr.* Upper Amazons.
hilaris *Burm.* Paraguay.
egregius *Scl.* Guiana (Demerara?).
glaucifrons v. *Martens*. Argentine Republic (prov. S. Luis).
Bolborhynchus monachus (*Bodd.*). Interior of Brazil, Paraguay, and Argentine Republic.
luchsi *Pelz.* Bolivia.
aymara *d'Orb.* Bolivia and Western Argentine Republic.
rubrirostris *Burm.* Western Argentine Republic.
orbignianus (*Bp.*). Bolivia and Peru.
andicola (*Finsch*). Peru.
Brotogerys virescens (*Gm.*). Lower Amazons.
subcærulea (*Lawr.*). Panama.
ferrugineifrons *Lawr.* Colombia.
jugularis *Deville*. Interior of Guiana and Upper Amazons.
tuipara (*Gm.*). Guiana, Venezuela, and Lower Amazons.
chrysosema *Scl.* Banks of the River Madeira.
tui (*Gm.*). Brazil.
Chrysotis festiva (*Linn.*). Guiana, Venezuela, and Amazons.
bodini *Finsch*. (Hab. ignot.)
cyanopsis (*Vieill.*). Antilles.
pretrei (*Temm.*). South Brazil.
viridigenalis *Cassin*. Colombia and Ecuador.
dufresniana (*Kuhl.*). Brazil.
nattereri *Finsch*. Interior of Brazil.
ochroptera (*Gm.*). Venezuela.
xanthops (*Spix*). Interior of Brazil.
erythrura (*Kuhl.*). Brazil.
lactifrons *Lawr.* (Hab. ignot.)

Chrysotis cæligena *Lawr.* Guiana.
canipalliata *Caban.* Colombia.
panamensis *Caban.* Panama.
Pionus corallinus *Bp.* Ecuador.
sordidus (*Linn.*). Venezuela.
violaceus (*Bodd.*). Guiana and Lower Amazons.
Pionopsitta melanotis (*Lafr.*). Bolivia.
pyrrhops *Salv.* Western Ecuador.
Caica pyrilia (*Bp.*). Colombia.
vulturina (*Kuhl.*). Lower Amazons.
leucogastra (*Kuhl.*). Lower Amazons.
Urochroma stictoptera *Scl.* Colombia.
surda (*Kuhl.*). Brazil.
melanonota (*Kuhl.*). Brazil.
purpurata (*Gm.*). Guiana and Lower Amazons.
dilectissima *Scl. et Salv.* Venezuela.
Psittacula sclateri *Gray.* Upper Amazons.

## Family STRIGIDÆ.

Aluco punctatissima *Gould.* Galapagos Islands.
flammea glaucops (*Kaup.*). St. Domingo.
Ciccaba huhula (*Daud.*). Guiana, Amazons, and Brazil.
melanonota (*Tsch.*). Brazil and Peru.
suinda (*Vieill.*). Brazil and Paraguay.
cayennensis (*Gm.*). Guiana.
polygrammica *Gray.* Brazil.
albigularis *Cassin.* Colombia and Ecuador.
nigro-lineata spilonota (*Gray*). Colombia.
Strix rufipes (*King*). Patagonia.
hylophilum (*Temm.*). Brazil, Guiana, and Venezuela.
Nyctalitinus harrisi (*Cassin*). Colombia.
Lophostrix cristata (*Daud.*). Guiana and Lower Amazons.
Scops nudipes (*Vieill.*). Costa Rica to Colombia.
brasilianus atricapillus (*Temm.*) Northern Brazil.
brasilianus ustus *Scl.* Upper Amazons.
Speotyto cunicularia guadeloupensis *Ridg.* Island of Guadeloupe.
Glaucidium phalænoides (*Daud.*). Trinidad.
tephronotum *Sharpe.* South America.
cobanense *Sharpe.* Central Guatemala.

## Family FALCONIDÆ.

Rupornis magnirostris saturatus (*Scl. et Salv.*). Bolivia.
Buteo galapagensis (*Gould*). Galapagos Islands.
unicolor *D'Orb. et Lafr.* Bolivia.
hypospodius *Gurney.* Brazil, Amazons, Venezuela, and Colombia.
pœcilochrous *Gurney.* Ecuador.

Urubitinga gundlachi (*Caban.*). Cuba.
Leucopternis palliata (*Pelz.*). Brazil.
scotoptera (*Max.*). Brazil.
albicollis (*Lath.*). Guiana, Amazons, Venezuela, and Trinidad.
melanops (*Lath.*) Guiana and Amazons.
superciliaris (*Pelz.*). Lower Amazons.
princeps *Scl.* Costa Rica.
plumbea *Salv.* Ecuador.
occidentalis *Salv.* Western Ecuador.
Plangus neogæus *Sundev.* Brazil.
Harpyhaliaëtus coronatus (*Vieill.*). South Brazil to Patagonia.
Morphnus tæniatus *Gurney.* Eastern Ecuador.
Spizaëtus isidorei (*Des Murs*). Colombia.
Accipiter guttatus (*Vieill.*). Bolivia and Paraguay.
pectoralis *Bp.* Brazil and Amazons.
fringilloides (*Vig.*). Cuba.
chionogaster *Kaup.* Guatemala and Venezuela.
collaris *Scl.* Colombia.
nigro-plumbeus *Lawr.* Western Ecuador.
salvini *Ridgw.* Venezuela.
poliogaster (*Temm.*). Brazil.
Micrastur zonothorax (*Cab.*). Venezuela and Colombia.
concentricus (*Less.*). Guiana, Amazons, and Bolivia.
amaurus *Gurney.* Panama.
pelzelni *Ridgw.* Eastern Peru.
Geranospizias hemidactylus (*Temm.*). Guiana and Amazons.
Tinnunculus [?] ferrugineus (*De Sauss.*) *Ridgw.* Haiti.
(?) Rostrhamus leucopygus (*Spix*). Brazil.
tæniurus *Cab.* Amazons.
Regerhinus megarhynchus (*Des Murs*). Upper Amazons.
Spiziapteryx circumcinctus (*Kaup*). Argentine Republic.
(?) Ibycter formosus (*Lath.*). Brazil.
ater (*Vieill.*). Colombia, Guiana, and Amazons.
Milvago carunculatus (*Des Murs*). Colombia and Ecuador.
albigularis (*Gould*). Patagonia.

### Family CATHARTIDÆ.

Cathartes pernigra *Sharpe.* Brazil.
Sarcorhamphus æquatorialis *Sharpe.* Ecuador, Peru, and Chili.

### Family PELECANIDÆ.

Pelecanus molinæ *Gray.* Coasts of Chili and Peru.

### Family PHALACROCORACIDÆ.

Phalacrocorax bougainvillei (*Less.*). Peru and Chili.

### Family ARDEIDÆ.

Butorides plumbeus (*Sund.*). Galapagos Islands.
Tigrisoma fasciatum (*Such*). Brazil.
Nyctherodius pauper *Scl. et Salv.* Galapagos Islands.

### Family PLATALEIDÆ.

Cercibis oxycerca (*Spix*). Colombia, Amazons, Guiana, and Brazil.

### Family PHŒNICOPTERIDÆ.

Phœnicopterus glyphorhynchus *Gray.* Galapagos Islands.
andinus *Philippi.* Chilian Andes.

### Family PALAMEDEIDÆ.

Palamedea cornuta *Linn.* Guiana and Amazons.
Chauna derbiana *Gray.* Coast-region of Colombia.

### Family ANATIDÆ.

"Bernicla" dispar *Ph. et Landb.* Chili, Argentine Republic, and Patagonia.
poliocephala (*Gray*). Chili, Pategonia, and Falkland Islands.
rubidiceps (*Scl.*). Falkland Islands.
inornata (*King*). Patagonia.
Sarcidiornis melanonota (*Gm.*). Paraguay to Guiana.
"Anas" chalcoptera *Kittl.* Chili and Patagonia.
Querquedula torquata (*Vieill.*). Argentine Republic.
oxyptera (*Meyen*). Peru.
andium *Scl. et Salv.* Ecuador.
versicolor (*Vieill.*) Argentine Republic, Chili, Patagonia, and Falkland Islands.
puna (*Tsch.*). Peru and Bolivia.
"Fuligula" nationi *Scl.* Western Peru.
Merganetta turneri *Scl. et Salv.* High Peru.
leucogenys *Tsch.* Colombia to Peru.
"Mergus" brasiliensis (*Vieill.*). South Brazil.

### Family COLUMBIDÆ.

Columba gymnophthalma *Temm.* Interior of Brazil.
plumbea *Vieill.* Brazil, Peru, and Colombia.
albipennis *Scl. et Salv.* Peru, and high Bolivia.
Zenaida ruficauda *Bp.* Venezuela and Colombia.
Metriopelia aymara (*Knip et Prévost*). Bolivia and Peru.
Melopelia plumbescens *Lawr.* Guiana.
Columbula campestris (*Spix*). Interior of Brazil.

Chamæpelia cruziana (*Knip et Prév.*). Peru and Western Ecuador.
buckleyi *Scl. et Salv.* Ecuador.
Gymnopelia erythrothorax (*Meyen*). Bolivia and Western Peru.
Peristera geoffroyi (*Temm.*) Brazil.
cyanopis *Pelzeln.* Interior of Brazil.
Leptoptila ochroptera *Pelz.* Brazil.
megalura *Scl. et Salv.* Bolivia.
Geotrygon caniceps *Cab.* Cuba.
frenata (*Tsch.*). Peru.
Osculatia sapphirina *Bp.* Western Ecuador.
purpurata *Salv.* Ecuador.

## Family CRACIDÆ.

Crax globulosa *Spix.* Upper Amazons.
daubentoni *Gray.* Venezuela.
carunculata *Temm.* South Brazil.
alberti *Fraser.* Colombia.
mikani *Pelz.* (Hab. ignot.)
pinima *Pelz.* Brazil (Para).
erythrognatha *Scl. et Salv.* Interior of Colombia.
Nothocrax urumutum *Spix.* Guiana and Upper Amazons.
Pauxi galeata (*Lath.*). Guiana and Venezuela.
Mitua tuberosa (*Spix*). Guiana, Upper Amazons, and Peru.
tomentosa (*Spix*). Guiana.
salvini *Reinh.* Brazil.
Stegnolæma montagnii (*Bp.*). Colombia and Ecuador.
Penelope greeyi *Gray.* Colombia.
jacucaca *Spix.* Eastern Brazil.
jacupeba *Spix.* South Brazil.
cristata (*Linn.*). Costa Rica to Colombia, Guiana.
boliviana *Reich.* Upper Amazons.
rufiventris *Tsch.* Bolivia and Peru.
pileata *Wagl.* Amazons.
ochrogaster *Pelz.* Interior of Brazil.
rufiventris *Tschudi.* Peru and Bolivia.
sclateri *Gray.* Bolivia.
Pipile cujubi (*Pelz.*). Lower Amazons.
Aburria carunculata *Reich.* Colombia.
Chamæpetes goudoti (*Lesson*). Colombia to Peru.
Ortalida motmot (*Linn.*). Guiana.
araucuan (*Spix*). Lower Amazons.
ruficeps *Wagl.* Brazil.
ruficauda *Jard.* Tobago and Venezuela.
canicollis *Wagl.* Paraguay.
albiventris *Wagl.* Eastern Brazil.
caracco *Wagl.* Colombia and Upper Amazons.

Ortalida superciliaris *Gray*. (Hab. igot.)
ruficrissa *Scl. et Salv.* Colombia.
leucogastra *Gould.* Western Guatemala and Nicaragua.
garrula (*Humb.*). Colombia.
erythroptera *Scl. et Salv.* Western Ecuador.

### Family PERDICIDÆ.

Cyrtonyx sallæi *Verreaux.* Mexico.
Eupsychortyx sonninii (*Temm.*). Guiana and Venezuela.
parvicristatus *Gould.* Colombia.
leucotis *Gould.* Colombia.
hypoleucus *Gould.* Gautemala.
Dendrortyx macrurus (*Jard. et Selby*). Mexico.
barbatus *Gould.* Mexico.
Odontophorus pachyrhynchus *Gould.* Peru and Colombia.
speciosus *Tsch.* Peru.
dentatus *Temm.* Brazil.
columbianus *Gould.* Venezuela.
stellatus *Gould.* Upper Amazons.
balliviani *Gould.* Bolivia and Peru.
strophium *Gould.* South America.
thoracicus *Gambel.* Mexico and Guatemala.
erythrops *Gould.* Ecuador.
melanonotus *Gould.* Ecuador.
hyperythrus *Gould.* Colombia.
hypospodius *Scl. et Salv.* Colombia.
spodiostethus *Salv.* Veragua.
cinctus *Salv.* Veragua.

### Family RALLIDÆ.

Rallus maculatus *Bodd.* Panama, Colombia, Trinidad, Guiana, Paraguay, and South Brazil.
antarcticus *King.* Chili.
semiplumbeus *Scl.* Colombia.
nigricans *Vieill.* South Brazil and Paraguay.
Aramides albiventris *Lawr.* Mexico, Guatemala, and Honduras.
ruficollis (*Gm.*). Guiana.
saracura (*Spix*). Paraguay and South Brazil.
mangle (*Spix*). South and East Brazil.
calopterus *Scl. et Salv.* Eastern Ecuador.
Porzana albicollis (*Vieill.*). Paraguay, South Brazil, Guiana, and Venezuela.
cayennensis (*Gm.*). Guiana, Amazons, and Brazil.
levraudi *Scl. et Salv.* Venezuela.
concolor (*Gosse*). Jamaica, Guatemala, and Brazil.

Porzana castaneiceps *Scl. et Salv.* Eastern Peru.
    hauxwelli *Scl. et Salv.* Upper Amazons.
    melanophæa (*Vieill.*). South Brazil, Paraguay, Bolivia, and Venezuela.
    albigularis (*Lawr.*). Panama, Costa Rica, and Mosquita.
    leucopyrrha (*Vieill.*). Paraguay, Argentine Republic, and South Brazil.
    flaviventris (*Bodd.*). Guiana, Jamaica, Cuba, Venezuela, Brazil, and Paraguay.
    spilonota (*Gould*). Galapagos Islands.
    notata (*Gould*). Argentine Republic and Patagonia.
    cinerea (*Vieill.*). Guiana, Amazons, Peru, and Trinidad.
    erythrops *Scl.* Western Peru.
    œnops *Scl. et Salv.* Eastern Ecuador.
Thyrorhina schomburgki (*Cab.*). Guiana and Venezuela.
Ionornis parvus (*Bodd.*). Guiana, Amazons, and interior of Brazil.
Fulica cornuta *Bp.* Bolivia.
    ardesiaca *Tsch.* Bolivia to Ecuador.
    armillata *Vieill.* South Brazil, Paraguay, Patagonia, and Chili.
    leucopygia (*Hartl.*). Uruguay, Patagonai, Falkland Islands, and Chili.
    leucoptera *Vieill.* Argentine Republic, Uruguay, and Bolivia.

### Family PSOPHIIDÆ.

Psophia crepitans *Linn.* Guiana.
    napensis *Scl. et Salv.* Eastern Ecuador.
    ochroptera *Pelz.* Interior of Guiana.
    leucoptera *Spix.* Upper Amazons.
    viridis *Spix.* Banks of the Madeira River.
    obscura *Pelz.* Lower Amazons.

### Family ŒDICNEMIDÆ.

Œdicnemis superciliaris *Tsch.* Western Peru.

### Family CHARADRIIDÆ.

Pluvianellus sociabilis *Hombr. et Jacq.* Straits of Magellan.

### Family HÆMATOPODIDÆ.

Hæmatopus leucopus (*Garnot*). Falkland Islands.

### Family THINOCORIDÆ.

Attagis latreillei *Lesson.* Bolivia.
    chimborazensis *Scl.* Andes of Ecuador.
    malouina (*Bodd.*). Falkland Islands and Straits of Magellan.
Thinocorus orbignyanus *Geoffr. et Less.* Chili and Peru.

### Family RECURVIROSTRIDÆ.

Recurvirostra andina *Ph. et Landb.* High Peru.

### Family SCOLOPACIDÆ.

Gallinago frenata (*Max.*). Guiana, Brazil, and Antarctic America.
  undulata (*Bodd.*). Guiana.
  gigantea (*Temm.*). South Brazil.
  stricklandi *Gray.* Chili and Patagonia.
  jamesoni (*Bp.*). High Ecuador.
  imperialis *Scl. et Salv.* High Colombia.
Phegornis mitchelli (*Fraser*). Chili.

### Family LARIDÆ.

Sterna exilis *Tsch.* Peru and Chili.
  eurygnatha *Saunders.* Brazil and Trinidad.
Larus fuliginosus *Gould.* Galapagos Islands.
  serranus *Tsch.* Peru, Bolivia, and Argentine Republic.
Megalestris chilensis (*Bp.*). Chili and Straits of Magellan.

### Family PROCELLARIIDÆ.

Diomedea melanophrys (*Temm.*). Falkland Islands and coasts of Antarctic America.
Procellaria tethys *Bonap.* Galapagos Islands.
Pelagodroma marina (*Lath.*). Coasts of Southern South America.
Puffinus elegans *Gigl. et Salvad.* South Atlantic Ocean.
  tenebrosus *Natt.* Coasts of Antarctic America.
Priofinus antarcticus (*Gm.*). Straits of Magellan.
Œstrelata fuliginosa (*Kuhl.*). Coasts of Brazil.
  phæopygia *Salv.* Galapagos Islands.
  defilippiana *Gigl. et Salvad.* Southeastern Pacific.
  arminjoniana *Gigl. et Salvad.* Trinidad and Southern Atlantic.
  magentæ *Gigl. et Salvad.* South Pacific Ocean.
  externa *Salv.* Island of Mas-a-fuera.
Prion vittatus (*Gm.*). Coasts of Brazil.
Halodroma berardi (*Q. et G.*). Falkland Islands.
Pseudoprion turtur (*Smith*). Falkland Islands.

### Family PODICEPEDIDÆ.

Centropelma micropterum *Gould.* High Bolivia.

### Family SPHENISCIDÆ.

Eudyptula serresiana *Oust.* Faierland Islands.
Spheniscus mendiculus *Sund.* Galapagos Islands.
Dasyrhamphus herculis *Finsch.* (Hab. ignot.)

## Family TINAMIDÆ.

Tinamus solitarius (*Vieill.*). Paraguay and Brazil.
tao (*Temm.*). Amazons, Guiana, Venezuela, and Colombia.
ruficeps *Scl. et Salv.* Western Ecuador to Veragua.
major (*Gm.*). Brazil.
subcristatus *Cab.* Guiana.
guttatus *Pelzeln.* Upper Amazons.
Nothocercus julius *Bp.* Colombia and Ecuador.
nigricapillus *Gray.* (Hab. ignot.)
Crypturus cinereus (*Gm.*). Guiana and Amazons.
obsoletus (*Temm.*). Brazil and Paraguay.
castaneus (*Scl.*). Colombia.
tataupa (*Temm.*). South Brazil and Paraguay.
cerviniventris *Scl. et Salv.* Venezuela.
parvirostris *Wagl.* Brazil.
strigulosus (*Temm.*). Brazil.
erythropus (*Pelz.*). Interior of Guiana.
noctivagus (*Max.*). Brazil.
variegatus (*Gm.*). Guiana and Lower Amazons.
bartletti *Scl. et Salv.* Upper Amazons.
radiatus *Gray.* Bolivia.
undulatus (*Temm.*). Brazil and Amazons.
transfasciatus *Scl. et Salv.* Ecuador.
Rhynchotus maculicollis *Gray.* Bolivia.
Nothoprocta perdicaria (*Kittl.*). Chili.
ornata (*Gray*). Bolivia.
pentlandi (*Gray*). Bolivia.
curvirostris *Scl. et Salv.* Ecuador.
taczanowskii *Scl. et Salv.* High Peru.
branickii *Taczan.* Central Peru.
dœringi *Caban.* Argentine Republic.
punctulata *Gay.* Chili.
Nothura marmorata *Gray.* Bolivia.
boraquira (*Spix*). Brazil, Paraguay, and Argentine Republic.
media (*Spix*). Brazil.
Taoniscus nanus (*Temm.*). Brazil and Paraguay.
Calodromas elegans (*D'Orb et Is. Geoffr.*). Argentine Republic.
Tinamotis pentlandi *Vigors.* Bolivian and Peruvian Andes.

## Family RHEIDÆ.

Rhea macrorhyncha *Scl.* (Hab. ignot.)
Pterocnemis darwini (*Gould*). Patagonia.

## DESCRIPTION OF A NEW SUB-SPECIES OF LOXIGILLA FROM THE ISLAND OF ST. CHRISTOPHER, WEST INDIES.

### By GEORGE N. LAWRENCE.

**Loxigilla portoricensis** var. *grandis.*

*Male.*—The general plumage is of a deep lustrous black, with the top and sides of the crown, the throat and under tail-coverts deep bright rufous; the under wing-coverts are white; the bill and feet are black.

Length (skin), 8⅛ inches; wing, 4; tail, 3⅛; tarsus, 1.

As the plumage of the female is similar to that of the male, it seemed so different from the recorded olive-colored plumage of the females of all others of the genus, that I wrote to Mr. Ober, asking if he was confident that the sexes were rightly determined; he replied that he was. I thought this marked difference in the coloring of the female would entitle it to full specific distinction.

In his work on the Birds of Porto Rico, Dr. Gundlach describes the female of *L. portoricensis* as being olive-colored. Therefore I wrote to him stating the close resemblance between the males of the birds from Porto Rico and St. Kitts, and called his attention to the fact that in the latter island the female resembled the male in plumage. He answered that he had just received a letter from his correspondent in Porto Rico, Dr. Stahl, who informed him that the female of *L. portoricensis* was like the male.

Length of ♀, 8 inches; wing, 3¾; tail, 3⅛; tarsus, 1.

Types in the National Museum, Washington.

In the collection from Mr. Ober were nine specimens, one only in the olive-colored plumage, which was marked as a male. The collection also contained specimens of *Loxigilla noctis.*

*Remarks.*—The above-described bird in distribution of colors closely resembles *L. portoricensis;* the only noticeable difference is, that in the Porto Rico species the under wing-coverts are white, lightly marked with rufous. It is, however, larger, the bills as a rule markedly so, but in the only specimen in my collection from Porto Rico the bill is as large as that of the female from St. Kitts chosen as the type; but that of the male is larger.

In quite a large series of *L. portoricensis* belonging to the Smithsonian Institution, the bills average much smaller. Many of these are in the olive-colored plumage, but all are without distinction of sex.

Probably in the two forms from Porto Rico and St. Kitts, all the olive-colored birds are the young of both sexes.

Mr. F. A. Ober visited St. Christopher on his second expedition to the West Indies in 1880, but the time spent there was too limited to admit of a satisfactory collection of its birds being made. The only one obtained of special interest is that now described.

Mr. Ober's note of it is as follows:

"219. 'Black bird,' ♂, Mt. Misery. May 21, 1880.

"General plumage soft, glossy black; chin and throat, top of head and extending back over the eyes on each side, and under tail-coverts rusty red; bill and feet black. Depth of bill ¾ inch.

"Sexes alike; young male different.

"Length, 8¼ inches; wing, 4¼; alar extent, 13."

JUNE 10, 1881.

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## NOTES ON THE MORTALITY AMONG FISHES OF THE GULF OF MEXICO.

### By S. H. JOHNSON.

CUSTOM-HOUSE, CORPUS CHRISTI, TEXAS,
*Collector's Office, June* 17, 1881.

Prof. SPENCER F. BAIRD,
*U. S. Commissioner of Fish and Fisheries, Washington, D. C.:*

SIR: Noticing in the Forest and Stream of 9th instant some answers to queries as to the cause of mortality among fishes in the Gulf of Mexico, I make bold to present the result of my observations.

After very heavy rains and overflowing of rivers, the inner bays on the Texas coast suffer a loss of from one-half to three-fourths of their stock of salt-water fish, not including mullet, which live as well in fresh as salt water. In fact land-locked mullet in a fresh-water pond or tank grow to a weight of nine or ten pounds.

Last winter, after a heavy rain and a freeze, *all* the salt-water fish in the *Laguna del Madre* (a large sheet of water lying between Padre Island and the mainland) were found dead on the banks.

We have two causes for destruction of fish here, viz., too much fresh water and too cold weather.

In the lagoon above spoken of, in a long drought, the water gets too salty for the fish, and they become covered with sores, and unless relieved by a rain they die from too much salt.

I have never known any serious mortality among fish on the Gulf coast where there was free flow of water, except during violent storms, when many fish both small and large were beached and killed.

Very respectfully,

S. H. JOHNSON,
*Collector.*

## THE COMPARATIVE ACTION OF DRY HEAT AND SULPHUROUS ACID UPON PUTREFACTIVE BACTERIA.

Pieces of woolen and cotton cloths and wadding were dipped in a solution of putrefying flesh and slightly dried; and after being shown to be infected by causing discoloration and development of bacteria in a Pateur solution, one portion was subjected to dry heat, and the other to the influence of a definite quantity of sulphurous acid. When these agents had operated for a certain time, the substances were brought into a developing liquid and again observed.

These experiments, which were conducted by Dr. Wermch, were as follows:

First. Fragments of the materials above referred to, treated as mentioned and dried, produced in sixteen experiments an exceptionably rapid disturbance of the test liquid. In four experiments with wadding this was somewhat retarded. It took place most rapidly in tubes which had been inoculated with woolen thread.

Second. After inoculation with the material which had been exposed one or two minutes to a dry heat of 284° to 300° F., clouding took place in four of eight experiments; but only after from two to three days. With material which had been exposed from ten to sixty minutes to a heat of 230°–244° F., in five out of six experiments a development of bacteria took place after the end of twenty-four hours.

Third. Substances which were exposed five minutes to a heat of 257° to 302° F. produced no infection whatever in ten experiments. The test liquid remained clear for eleven days from the time of inoculation.

Fourth. When the objects were exposed under a bell glass to the action of a percentage, by volume, of 1.5, 2.2, and 3.3 of sulphurous acid, in eight out of nine experiments a bacterial clouding was developed in the sulphurized material, whether the application had continued for one hour or twenty-two.

Fifth. In fifteen experiments, in which sulphurous acid constituted 4.6 and 7.15 per cent., by volume, of the contents of the bell glass, the introduction of the sulphurized material produced no cloudiness, when the experiment continued six hours and more. On the other hand an exposure of 20, 40, 60, and 200 minutes was followed by the development of bacteria.

In conclusion, the fact was considered especially interesting that the different fabrics gave up the infection concealed in them with different degrees of rapidity, the woolen fiber the quickest, the linen less easily, and the wadding with the greatest difficulty of all.

## LIST OF SPECIAL DESIDERATA AMONG NORTH AMERICAN BIRDS.

### By ROBERT RIDGWAY.

[The following list includes the species of North American birds specimens of which are particularly desired by the United States National Museum, and which it is hoped that correspondents may be able to supply.

The species marked with a * are not represented at all in the collection, consequently specimens in any plumage and of any age will be acceptable. Of those distinguished by a † the collection contains no American specimens, while in the case of others the particular deficiencies are explained. When no remarks follow the name of a species it should be understood that specimens of any stage of plumage are desired.

The numbers and names correspond with those of the new Smithsonian catalogue.]

2. *Hylocichla fuscescens* (Steph.) Baird. Tawny Thrush. (Young in first plumage.)

3. *Hylocichla aliciæ* Baird. Gray-cheeked Thrush. (Young in first plumage.)

4. *Hylocichla ustulata* (Nutt.) Baird. Russet-backed Thrush. (Especially first plumage.)

4 *a*. *Hylocichla ustulata swainsoni* (Caban.) Ridgw. Olive-backed Thrush. (First plumage.)

5. *Hylocichla unalascæ* (Gmel.) Ridgw. Dwarf Thrush. (First plumage.)

† [6.] *Turdus iliacus* Linn. Gray-cheeked Thrush. Various stages (autumnal adult only is represented).

8. *Merula confinis* (Baird) Ridgw. Saint Lucas Robin. (Type specimen still unique.)

13 *a*. *Harporhynchus rufus longirostris* (Lafr.) Coues. Mexican Brown Thrasher. (Especially first plumage.)

14. *Harporhynchus cinereus* Xantus. Saint Lucas Thrasher.

14 *a*. *Harporhynchus cinereus bendirei* (Coues) Hensh. Bendire's Thrasher. (Especially first plumage.)

15 *a*. *Harporhynchus curvirostris palmeri* Ridgw. Palmer's Thrasher. (Especially first plumage.)

16 *a*. *Harporhynchus redivivus lecontei* (Lawr.) Coues. Leconte's Thrasher. (Especially first plumage.)

17. *Harporhynchus crissalis* Henry. Rufous-vented Thrasher. (Especially first plumage.)

18. *Harporhynchus graysoni* Baird. Socorro Thrasher. (Especially first plumage.)

† [20.] *Cyanecula suecica* (Linn.) Brehm. Blue-throated Warbler. (American specimens.)

[21.] *Saxicola œnanthe* (Linn.) Bechst. Stone Chat. (First plumage.)
25. *Myiadestes townsendi* (Aud.) Caban. Townsend's Solitaire.
28. *Polioptila plumbea* Baird. Plumbeus Gnatcatcher.
29. *Polioptila californica* Brewster. Black-tailed Gnatcatcher.
31. *Regulus obscurus* Ridgw. Dusky Kinglet.
*32. *Regulus cuvieri* Aud. Cuvier's Kinglet.
[34.] *Phylloscopus borealis* (Blas.) Dresser. Kennicott's Warbler.
35. *Chamœa fasciata* Gamb. Ground Tit.
41 *b*. *Parus atricapillus occidentalis* (Baird) Coues. Oregon Chickadee.
†43. *Parus meridionalis* Scl. Mexican Chickadee.
[44.] *Parus cinctus* Bodd. Siberian Chickadee. (Especially first plumage.)
†49. *Psaltriparus melanotis* (Hartl.) Bp. Black-eared Tit.
†55 *a*. *Certhia familiaris mexicana* (Gloger) Ridgw. Mexican Creeper.
†(?) 59. *Catherpes mexicanus* (Sw.) Baird. Mexican White-throated Wren. (The supposed occurrence of this form in the United States rests solely upon Giraud's type of his *Certhia albifrons*, said to be from Texas, which is in the National collection.)
†60 *a*. *Thryothorus ludovicianus berlandieri* (Couch) Coues. Berlandier's Wren.
60 *b*. *Thryothorus ludovicianus miamensis* Ridgw. Florida Wren.
62. *Thryomanes brevicauda* Ridgw. Guadalupe Wren.
64. *Troglodytes insularis* Baird. Socorro Wren.
65. *Anorthura troglodytes hyemalis* (Vieill.) Coues. Winter Wren.
65 *a*. *Anorthura troglodytes pacificus* (Baird.) Ridgw. Western Winter Wren. (First plumage.)
†[69.] *Motacilla alba* Linn. White Wagtail.
[72.] *Anthus pratensis* (Linn.) Bechst. European Titlark.
76. *Helonœa swainsoni* Aud. Swainson's Warbler.
78. *Helminthophaga bachmani* (Aud.) Caban. Bachman's Warbler. (Especially the female.)
79. *Helminthophaga pinus* (Linn.) Baird. Blue-winged Yellow Warbler. (First plumage.)
*80. *Helminthophaga lawrencei* Herrick. Lawrence's Warbler.
81. *Helminthophaga chrysoptera* (Linn.) Baird. Yellow-winged Warbler. (First plumage.)
*82. *Helminthophaga leucobronchialis* Brewster. White-throated Warbler.
83. *Helminthophaga luciæ* Cooper. Lucy's Warbler.
84. *Helminthophaga virginiæ* Baird. Virginia's Warbler.
85. *Helminthophaga ruficapilla* (Wils.) Baird. Nashville Warbler. (First plumage.)
87. *Helminthophaga peregrina* (Wils.) Baird. Tennessee Warbler. (First plumage.)
89. *Parula pitiayumi insularis* (Lawr.) Ridgw. Socorro Warbler. (First plumage.)

89 *a*. *Parula pitiayumi nigrilora* Coues. Sennett's Warbler.

90. *Perissoglossa tigrina* (Gmel.) Baird. Cape May Warbler. (First plumage.)

*91. *Perissoglossa carbonata* (Aud.) Baird. Carbonated Warbler.

92. *Peucedramus olivaceus* (Giraud) Coues. Olive-headed Warbler. (Especially first plumage.)

94. *Dendrœca cœrulescens* (Linn.) Baird. Black-throated Blue Warbler. (First plumage.)

97. *Dendrœca maculosa* (Gmel.) Baird. Black-and-yellow Warbler. (First plumage.)

99. *Dendrœca pennsylvanica* (Linn.) Baird. Chestnut-sided Warbler. (First plumage.)

100. *Dendrœca castanea* (Wils.) Baird. Bay-breasted Warbler. (First plumage.)

103. *Dendrœca dominica* (Linn.) Baird. Yellow-throated Warbler.

103 *a*. *Dendrœca dominica albilora* Baird. White-browed yellow-throated Warbler. (First plumage.)

106. *Dendrœca chrysoparia* Scl. & Salv. Golden-cheeked Warbler. (A series very desirable.)

108. *Dendrœca townsendi* (Nutt.) Baird. Townsend's Warbler. (Especially first plumage.)

110. *Dendrœca kirtlandi* Baird. Kirtland's Warbler.

*112 *Dendrœca montana* (Wils.) Baird. Blue Mountain Warbler.

113. *Dendrœca palmarum* (Gmel.) Baird. Red-poll Warbler. (First plumage.)

114. *Dendrœca discolor* (Vieill.) Baird. Prairie Warbler. (First plumage.)

*116 *a*. *Siurus nævius notabilis* Grinnell. Grinnell's Water Thrush.

118. *Oporornis agilis* (Wils.) Baird. Connecticut Warbler. (Especially first plumage.)

120. *Geothlypis philadelphia* (Wils.) Baird. Mourning Warbler. (First plumage.)

121. *Geothlypis macgillivrayi* (Aud.) Baird. Macgillivray's Warbler. (First plumage.)

*126. *Myiodioctes minutus* (Wils.) Baird. Small-headed Flycatcher.

127. *Myiodioctes canadensis* (Linn.) Aud. Canadian Flycatching Warbler. (First plumage.)

†(?) 130. *Setophaga miniata* Swains. Red-bellied Redstart. (Giraud's type of his "*Muscicapa derhami*," said to be from Texas, is in the National Museum collection.)

†(?) 132. *Ergaticus ruber* (Swains.) Baird. Red Warbler. (The type specimen of Giraud's "*Parus leucotis*" is in the collection, and is said to have been obtained in Texas.)

†(?) 133. *Basileuterus culicivorus* (Licht.) Bonap. Brasher's Warbler. (Type of "*Muscicapa brasieri*" Giraud, said to have been obtained in Texas, is in the collection.)

(†?) 134. *Basileuterus belli* (Giraud) Scl. Bell's Warbler. (The type specimen, one of Giraud's "Sixteen Species of Texan Birds," is in the collection.)

135. *Vireosylvia olivacea* (Linn.) Bp. Red-eyed Vireo. (First plumage.)

136. *Vireosylvia agilis flavo-viridis* (Cass.) Ridgw. Yellow-green Vireo. (Especially first plumage.)

137. *Vireosylvia calidris barbatula* (Caban.) Ridgw. Black-whiskered Vireo. (Especially first plumage.)

138. *Vireosylvia philadelphica* Cass. Philadelphia Vireo. (Especially first plumage.)

140. *Lanivireo flavifrons* (Vieill.) Baird. Yellow-throated Vireo. (First plumage.)

141. *Lanivireo solitarius* (Vieill.) Baird. Blue-headed Vireo. (First plumage.)

142. *Vireo atricapillus* Woodh. Black-capped Vireo.

143. *Vireo noveboracensis* (Gm.) Bp. White eyed Vireo. (First plumage.)

144. *Vireo huttoni* Cass. Hutton's Vireo.

147. *Vireo vicinior* Coues. Gray Vireo.

148. *Lanius borealis* Vieill. Great Northern Shrike. (First plumage.)

* 149 *b*. *Lanius ludovicianus robustus* Baird. Large-billed Shrike.

150. *Ampelis garrulus* Linn. Northern Wax-wing. (First plumage.)

152 *a*. *Progne subis cryptoleuca* Baird. Cuban Martin.

159. *Certhiola bahamensis* Reich. Bahaman Honey Creeper.

†(?) 160. *Euphonia elegantissima* (Bp.) Gray. Blue-headed Euphonia. (The only presumably North American specimen of this species in the collection is the type of "*Pipra galericulata*" of Giraud.)

163. *Pyranga hepatica* Swains. Hepatic Tanager.

164 *a*. *Pyranga æstiva cooperi* Ridgw. Cooper's Tanager.

165. *Hesperiphona vespertina* (Cooper) Bp. Evening Grosbeak.

[167.] *Pyrrhula cassini* Baird. Cassin's Purple Finch.

171. *Carpodacus amplus* Ridgw. Guadalupe House Finch.

175. *Leucosticte tephrocotis* Swains. Gray-crowned Rosy Finch. (Summer adults and young in first plumage.)

175 *a*. *Leucosticte tephrocotis littoralis* (Baird) Coues. Hepburn's Rosy Finch. (Summer adults and young in first plumage.)

176. *Leucosticte atrata* Ridgw. Black Rosy Finch. (A series especially desired.)

177. *Leucosticte australis* Allen. Brown-capped Rosy Finch. (Especially winter specimens and young in first plumage.)

178. *Ægiothus canescens* Gould. Mealy Redpoll.

179 *a*. *Ægiothus linaria holbolli* (Brehm) Ridgw. Greater Redpoll.

* 180. *Ægiothus brewsteri* Ridgw. Brewster's Linnet.

182 *a*. *Astragalinus psaltria arizonæ* Coues. Arizona Goldfinch.

† (?) 182 *b*. *Astragalinus psaltria mexicanus* (Sw.) Coues. Mexican Goldfinch. (With the exception of the type of Giraud's "*Fringilla texensis*" there is no North American example of this form in the collection.)

† 184. *Chrysometris notata* (Du Bus) Bp. Black-headed Goldfinch.

188. *Centrophanes pictus* (Sw.) Caban. Smith's Longspur. (First plumage; also adults in summer.)

192. *Passerculus princeps* Maynard. Ipswich Sparrow. (A good series showing individual variations very much desired.)

193. *Passerculus sandwichensis* (Gmel.) Baird. Sandwich Sound Sparrow.

194. *Passerculus anthinus* Bonap. Titlark Sparrow.

195. *Passerculus guttatus* Lawr. Saint Lucas Sparrow.

196. *Passerculus rostratus* (Cass.) Baird. Large-billed Sparrow. (First plumage.)

199. *Coturniculus henslowi* (Aud.) Bp. Henslow's Sparrow.

200. *Coturniculus lecontei* (Aud.) Bp. Leconte's Sparrow.

201 *a*. *Ammodromus caudacutus nelsoni* Allen. Nelson's Sharp-tailed Finch. (The young in first plumage particularly desired.)

203. *Ammodromus nigrescens* Ridgw. Black-and-White Sea-side Finch. (A good series much wanted.)

205. *Zonotrichia querula* (Nutt.) Gamb. Harris's Sparrow. (Young in first plumage a special desideratum.)

207. *Zonotrichia gambeli* (Nutt.) Gamb. Gambel's White-crowned Sparrow. (A good series of adults and the young in first plumage.)

215. *Spizella atrigularis* (Caban.) Bd. Black-chinned Sparrow.

216. *Junco aikeni* Ridgw. White-winged Snowbird. (Especially the young in first plumage, and adults in summer plumage.)

219. *Junco annectens* Baird. Pink-sided Snowbird. (Particularly young in first plumage.)

221. *Junco dorsalis* Henry. Red-backed Snowbird.

222. *Junco cinereus* (Swains.) Caban. Mexican Snowbird.

223. *Junco insularis* Ridgw. Guadalupe Snowbird.

225. *Amphispiza belli* (Cass.) Coues. Bell's Sparrow. (Particularly young in first plumage.)

226. *Peucæa æstivalis* (Licht.) Caban. Bachman's Finch. (Young in first plumage an especial desideratum; adults also wanted.)

226 *a*. *Peucæa æstivalis illinoensis* Ridgw. Oak-wood's Sparrow. (Young in first plumage a particular desideratum.)

227. *Peucæa arizonæ* Ridgw. Arizona Sparrow.

228. *Peucæa cassini* (Woodh.) Baird. Cassin's Sparrow.

229. *Peucæa carpalis* Coues. Rufous-winged Sparrow.

230. *Peucæa ruficeps* (Cass.) Baird. Rufous-crowned Sparrow.

230 *a*. *Peucæa ruficeps boucardi* (Scl.). Boucard's Sparrow.

231 *c*. *Melospiza fasciata samuelis* Baird. Californian Song Sparrow.

231 *e*. *Melospiza fasciata rufina* (Brandt.) Baird. Sooty Song Sparrow.

235 *c*. *Passerella iliaca schistacea* (Baird) Allen. Slate-colored Sparrow.

236. *Embernagra rufivirgata* Lawr. Texas Sparrow. (Especially young in first plumage.)

237 *a*. *Pipilo erythrophthalmus alleni* Coues. Florida Towhee. (Especially young in first plumage.)

238. *Pipilo maculatus arcticus* (Swains.) Coues. Northern Towhee.

238 *b*. *Pipilo maculatus oregonus* (Bell.) Coues. Oregon Towhee.

238 *c*. *Pipilo maculatus consobrinus* Ridgw. Guadalupe Towhee.

238 *d*. *Pipilo maculatus carmani* Baird. Socorro Towhee.

240 *a*. *Pipilo fuscus albigula* (Baird) Coues. Saint Lucas Brown Towhee.

242 *a*. *Cardinalis virginianus igneus* (Baird) Coues. Saint Lucas Cardinal.

†247. *Passerina parellina* (Bp.) Ridgw. Blue Bunting.

250. *Passerina versicolor* (Bonap.) Gray. Varied Bunting.

252. *Spermophila moreletii* Pucheran. Morelet's Seedeater.

†253. *Phonipara zena* (Linn.) Bryant. Black-faced Seedeater.

255. *Spiza townsendi* (Aud.) Ridgw. Townsend's Bunting. (Type still unique.)

262. *Agelæus tricolor* (Nutt.) Bp. Red-and-white-shouldered Blackbird.

263 *a*. *Sturnella magna mexicana* (Scl.) Ridgw. Mexican Meadow Lark.

265. *Icterus vulgaris* Daud. Troupial.

266. *Icterus auduboni* Giraud. Audubon's Oriole. (Especially young in first plumage, and intermediate stages.)

†267. *Icterus wagleri* Scl. Wagler's Oriole.

268. *Icterus parisorum* Bonap. Scott's Oriole.

269. *Icterus cucullatus* Swains. Hooded Oriole.

278 *a*. *Quiscalus purpureus aglæus* (Baird) Coues. Florida Grackle.

†[279.] *Sturnus vulgaris* Linn. European Starling.

281. *Corvus cryptoleucus* Couch. White-necked Raven.

282 *b*. *Corvus frugivorus caurinus* (Baird) Ridgw. Northwestern Fish Crow.

287. *Pica nuttalli* Aud. Yellow-billed Magpie.

†288. *Psilorhinus morio* (Wagl.) Gray. Brown Jay.

291. *Aphelocoma floridana* (Bartr.) Caban. Florida Jay. (Especially young in first plumage.)

†294. *Aphelocoma ultramarina couchi* Baird. Couch's Jay.

295. *Aphelocoma sordida arizonæ* Ridgw. Arizona Jay.

296. *Xanthura luxuosa* (Less.) Bp. Green Jay. (Especially young in first plumage.)

297. *Perisoreus canadensis* (Linn.) Bp. Canada Jay.

298. *Perisoreus obscurus* Ridgw. Oregon Jay.

†[299.] *Alauda arvensis* Linn. Sky Lark.

†[302.] *Milvulus tyrannus* (Linn.) Bp. Fork-tailed Flycatcher.

303. *Tyrannus dominicensis* (Gm.) Reich. Gray Kingbird.

305. *Tyrannus melancholicus couchi* Baird. Couch's Kingbird.

†(?) 309. *Myiozetetes texensis* (Giraud) Scl. Giraud's Flycatcher. (The type specimen of this species is the only specimen in the collection from north of Mexico, and the locality of this is perhaps somewhat doubtful.)

†(?) 314. *Myiarchus lawrencei* (Giraud) Baird. Lawrence's Flycatcher. (No North American specimen in the collection, except the type of the species, said to be from Texas.)

323. *Empidonax difficilis* Baird. Western Yellow-bellied Flycatcher.

†(?) 329. *Empidonax fulvifrons* (Giraud) Scl. Fulvous Flycatcher. (The same remarks apply to this as to No. 314).

329 *a.* *Empidonax fulvifrons pallescens* Coues. Buff-breasted Flycatcher.

†332. *Pachyrhamphus major* (Bonap.) Scl. Thick-billed Flycatcher.

†333. *Hadrostomus aglaiæ* (Lafr.) Cab. Rose-throated Flycatcher.

341. *Selasphorus alleni* Hensh. Allen's Hummingbird.

342. *Atthis heloisæ* (Less.) Reich. Heloise's Hummingbird.

344. *Calothorax lucifer* (Swains.) Gray. Lucifer Hummingbird.

347. *Basilinna xantusi* (Lawr.) Elliott. Xantus's Hummingbird.

349. *Cypselus saxatilis* Woodh. White-throated Swift. (Especially young in first plumage.)

350. *Cypseloides niger borealis* (Kennerly) Ridgw. Black Swift.

352. *Chætura vauxi* (Towns.) De Kay. Vaux's Swift.

359. *Campephilus principalis* (Linn.) Gray. Ivory-billed Woodpecker. (Especially young, of both sexes.)

362. *Picus querulus* Wils. Red-cockaded Woodpecker. (Especially young.)

363 *a.* *Picus scalaris lucasanus* (Xant.) Ridgw. Saint Lucas Woodpecker.

365. *Picus stricklandi* Malh. Strickland's Woodpecker.

367. *Picoides arcticus* (Swains.) Gray. Black-backed Three-toed Woodpecker. (Especially young, of both sexes.)

368. *Picoides tridactylus americanus* (Brehm.) Ridgw. Banded-backed Three-toed Woodpecker. (A good series wanted from Maine or the British Provinces.)

369 *b.* *Sphyrapicus varius ruber* (Gm.) Ridgw. Red-breasted Woodpecker.

377 *a.* *Melanerpes formicivorus angustifrons* Baird. Narrow-fronted Woodpecker.

378 *a.* *Colaptes auratus hybridus* (Baird) Ridgw. "Hybrid" Flicker. (Especially Eastern specimens with red feathers in the black check-stripes.)

379. *Colaptes chrysoides* (Malh.) Baird. Malherbe's Flicker.

380. *Colaptes rufipileus* Ridgw. Guadalupe Flicker. (Adult male unknown!)

†381. *Momotus cæruleiceps* Gould. Blue-capped Motmot.

383. *Ceryle americana cabanisi* (Tschudi) Coues. Texan Kingfisher.

†384. *Trogon ambiguus* Gould. Coppery-tailed Trogon.

386. *Coccyzus seniculus* (Lath.) Vieill. Mangrove Cuckoo.

389. *Crotophaga ani* Linn. Savannah Blackbird.

*391. *Rhynchopsitta pachyrhyncha* (Swains.) Bp. Thick-billed Parrot.

392. *Conurus carolinensis* (Linn.) Kuhl. Carolina Parakeet.

393. *Conurus holochlorus brevipes* Baird. Socorro Parakeet.

394. *Aluco flammeus americanus* (Aud.) Ridgw. American Barn Owl. (Especially downy young.)

395. *Asio americanus* (Steph.) Sharpe. American Long-eared Owl. (Downy young.)

396. *Asio accipitrinus* (Pall.) Newton. Short-eared Owl. (Downy young.)

397. *Strix nebulosa* Forst. Barred Owl. (Downy young.)

397 *a*. *Strix nebulosa alleni* Ridgw. Florida Barred Owl.

398. *Strix occidentalis* (Xant.) Ridgw. Spotted Owl. (Especially downy young.)

399. *Ulula cinerea* (Gmel.) Bp. Great Gray Owl. (Especially downy young.)

[399 *a*]. *Ulula cinerea lapponica* (Retz.) Ridgw. Lapland Owl. (Especially downy young.)

400. *Nyctale tengmalmi richardsoni* (Bp.) Ridgw. Richardson's Owl.

401. *Nyctale acadica* (Gmel.) Bp. Saw-whet Owl. (Especially young.)

402. *Scops asio* (Linn.) Bp. Little Screech Owl. (Downy young.)

402 *a*. *Scops asio floridanus* Ridgw. Florida Screech Owl.

402 *b*. *Scops asio maccalli* (Cass.) Ridgw. Texan Screech Owl.

402 *c*. *Scops asio maxwelliæ* Ridgw. Rocky Mountain Screech Owl.

402 *d*. *Scops asio kennicotti* (Elliot) Ridgw. Northwestern Screech Owl.

403. *Scops trichopsis* Wagl. Mexican Screech Owl.

404. *Scops flammeolus* (Licht.) Scl. Flammulated Screech Owl.

405. *Bubo virginianus* (Gm.) Bp. Great Horned Owl. (Very young in down.)

405 *a*. *Bubo virginianus subarcticus* (Hoy) Ridgw. Western Horned Owl.

*405 *b*. *Bubo virginianus arcticus* (Swains.) Cass. Arctic Horned Owl.

405 *c*. *Bubo virginianus saturatus* Ridgw. Dusky Horned Owl.

406. *Nyctea scandiaca* (Linn.) Newt. Snowy Owl. (Downy young.)

407. *Surnia funerea* (Linn.) Rich & Sw. American Hawk Owl. (Downy young.)

†[407.] *Surnia funerea ulula* (Linn.) Ridgw. European Hawk Owl. (Especially downy young.)

408 *a*. *Speotyto cunicularia floridana* Ridgw. Florida Burrowing Owl.

409. *Glaucidium gnoma* Wagl. California Pigmy Owl. (Especially downy young.)

410. *Glaucidium phalænoides* (Daud.) Scl. and Salv. Ferruginous Pigmy Owl. (Especially downy young.)

411. *Micrathene whitneyi* (Cooper) Coues. Whitney's Pigmy Owl. (Especially downy young.)

412. *Hierofalco gyrfalco candicans* (Gm.) Ridgw. White Gyrfalcon. (Especially downy young.)

412 *a*. *Hierofalco gyrfalco islandus* (Gm.) Ridgw. Iceland Gyrfalcon. (Adults and downy young.)

412 *b*. *Hierofalco gyrfalco sacer* (Forst.) Ridgw. McFarlane's Gyrfalcon. (Series, especially adults.)

412 *c*. *Hierofalco gyrfalco obsoletus* (Gm.) Ridgw. Labrador Gyrfalcon. (A good series of both old and young wanted.)

413. *Hierofalco mexicanus polyagrus* (Cass.) Ridgw. Prairie Falcon. (Especially adults and downy young.)

414. *Falco peregrinus nævius* (Gm.) Ridgw. American Peregrine Falcon; Duck Hawk. (Adults and downy young.)

414 *a*. *Falco peregrinus pealei* Ridgw. Peale's Falcon.

†415. *Falco albigularis* Daud. Chestnut-thighed Falcon.

† [416.] *Æsalon regulus* (Pall.) Blyth. European Merlin. (Good series of all stages wanted.)

417. *Æsalon columbarius* (Linn.) Kaup. Pigeon Hawk.

417 *a*. *Æsalon columbarius suckleyi* Ridgw. Black Merlin.

418. *Æsalon richardsoni* Ridgw. Richardson's Merlin. (Especially fully adult male and downy young.)

419. *Rhynchofalco fusco-cærulescens* (Vieill.) Ridgw. Aplomado Falcon. (Especially downy young.)

420 *a*. *Tinnunculus sparverius isabellinus* (Swains.) Ridgw. Isabelline Sparrow Hawk.

421. *Tinnunculus sparverioides* (Vig.) Gray. Cuban Sparrow Hawk.

425. *Pandion haliaetus carolinensis* (Gm.) Ridgw. American Osprey; Fish Hawk. (Downy young.)

426. *Elanoides forficatus* (Linn.) Ridgw. Swallow-tailed Kite. (Especially downy young; good adults also wanted.)

427 *Elanus glaucus* (Bartr.) Coues. White-tailed Kite. (Especially downy young.)

428. *Ictinia subcærulea* (Bartr.) Coues. Mississippi Kite. (Especially downy young.)

429. *Rostrhamus sociabilis plumbeus* Ridgw. Everglade Kite. (Especially downy young.)

431. *Accipiter cooperi* Bonap. Cooper's Hawk. (Downy young.)

432. *Accipiter fuscus* (Gmel.) Bp. Sharp-shinned Hawk. (Downy young.)

433. *Astur atricapillus* (Wils.) Bp. American Goshawk. (Downy young; also good adults.)

433 *a*. *Astur atricapillus striatulus* Ridgw. Western Goshawk.

434. *Antenor unicinctus harrisi* (Aud.) Ridgw. Harris's Hawk.

436. *Buteo borealis* (Gm.) Vieill. Red-tailed Hawk. (Downy young.)

* 436 *a*. *Buteo borealis krideri* Hoopes. Krider's Hawk.

436 *b*. *Buteo borealis calurus* (Cass.) Ridgw. Western Red-tail. (Melanotic specimens.)

436 *c*. *Buteo borealis lucasanus* Ridgw. Saint Lucas Red-tail.

436 *d*. *Buteo borealis socorroensis* Ridgw. Socorro Red-tail.

437. *Buteo cooperi* Cass. Cooper's Henhawk.

438. *Buteo harlani* Aud. Harlan's Hawk.

439. *Buteo lineatus* (Gm.) Jard. Red-shouldered Hawk. (Downy young.)

439 *a*. *Buteo lineatus elegans* (Cass.) Ridgw. Red-bellied Hawk.

440. *Buteo abbreviatus* Caban. Zone-tailed Hawk. (Especially downy young.)

441. *Buteo albicaudatus* Vieill. White-tailed Hawk. (Especially downy young.)

442. *Buteo swainsoni* Bonap. Swainson's Hawk. (Especially downy young.)

443. *Buteo pennsylvanicus* (Wils.) Bp. Broad-winged Hawk. (Downy young; also adults.)

† 444. *Urubitinga anthracina* (Licht.) Lafr. Mexican Black Hawk. (Especially downy young.)

445. *Asturina nitida plagiata* (Licht.) Ridgw. Mexican Goshawk. (Especially downy young.)

446. *Onychotes gruberi* Ridgw. Gruber's Hawk. (Only two specimens known to exist in collections!)

447. *Archibuteo lagopus sancti-johannis* (Gmel.) Ridgw. American Rough-legged Hawk. (Downy young and melanotic specimens.)

448. *Archibuteo ferrugineus* (Licht.) Gray. Ferruginous Rough-leg. (Especially downy young and melanotic specimens.)

449. *Aquila chrysaetus canadensis* (Linn.) Ridgw. Golden Eagle. (Especially downy young.)

† 450. *Thrasaetus harpyia* (Linn.) Gray. Harpy Eagle.

† 452. *Haliaetus albicilla* (Linn.) Leach. Gray Sea Eagle. (Greenland specimens.)

453. *Pseudogryphus californianus* (Shaw) Ridgw. California Condor. (Adults and downy young.)

454. *Cathartes aura* (Linn.) Illig. Turkey Buzzard. (Downy young.)

455. *Catharista atrata* (Wils.) Less. Black Vulture; Carrion Crow. (Downy young.)

461. *Zenaidura graysoni* Baird. Socorro Dove.

462. *Zenaida amabilis* Bp. Zenaida Dove.

467. *Geotrygon martinica* (Gm.) Bp. Key West Dove.

†468. *Starnœnas cyanocephala* (Linn.) Bp. Blue-headed Dove.

469. *Ortalis vetula maccalli* (Baird) Ridgw. Chachalaca; Texan Guan. (Especially downy young.)

470. *Meleagris gallopavo* Linn. Mexican Turkey. (Downy young and young in first plumage.)

470 *a*. *Meleagris gallopavo americana* (Bartr.) Coues. Wild Turkey. (Downy young and young in first plumage.)

471 *a*. *Canace obscura fuliginosa* Ridgw. Sooty Grouse.

471 *b*. *Canace obscura richardsoni* (Dougl.) Baird. Richardson's Grouse.

472. *Canace canadensis* (Linn.) Bp. Canada Grouse; Spruce Partridge. (Downy young.)

472 *a*. *Canace canadensis franklini* (Dougl.) Baird. Franklin's Grouse.

473 *a*. *Bonasa umbellus umbelloides* (Dougl.) Baird. Gray Ruffed Grouse. (Downy young and young in first plumage.)

473 *b*. *Bonasa umbellus sabinei* (Dougl.) Coues. Oregon Ruffed Grouse. (Young in down and in first plumage.)

475. *Lagopus rupestris* (Gm.) Leach. Rock Ptarmigan. (Adults in summer plumage and downy young.)

476. *Lagopus leucurus* Sw. White-tailed Ptarmigan. (Downy young and adults in winter plumage.)

477 *a*. *Cupidonia cupido pallidicincta* Ridgw. Lesser Prairie Hen. (Especially young in first plumage and in down.)

478. *Pediœcetes phasianellus* (L.) Elliot. Northern Sharp-tailed Grouse. (Especially young in first plumage and in down.)

480 *a*. *Ortyx virginiana floridana* Coues. Florida Quail. (Especially chick and young in first plumage.)

480 *b*. *Ortyx virginiana texana* (Lawr.) Coues. Texan Quail. (Especially chick and young in first plumage.)

481. *Oreortyx picta* (Dougl.) Baird. Mountain Quail. (Chick.)

481 *a*. *Oreortyx picta plumifera* (Gould) Ridgw. Plumed Quail. (Chick.)

484. *Callipepla squamata* (Vig.) Gray. Scaled Quail. (Chick and young in first plumage.)

486. *Ardea occidentalis* Aud. Great White Heron; Würdemann's Heron. (A series including all ages and phases of plumage much needed.)

†499. *Mycteria americana* Linn. Jabiru.

500. *Tantalus loculator* Linn. Wood Ibis. (Downy young.)

501. *Eudocimus albus* (Linn.) Wagl. White Ibis. (Downy young.)

†502. *Eudocimus ruber* (Linn.) Wagl. Scarlet Ibis. (Downy young.)

503. *Plegadis falcinellus* (Linn.) Kaup. Glossy Ibis. (Especially downy young.)

505. *Ajaja rosea* (Reich.). Roseate Spoonbill. (Downy young.)

† [506]. *Hœmatopus ostragelus* Linn. European Oystercatcher. (Young in first plumage and in down.)

508. *Hœmatopus niger* Pall. Black Oystercatcher. (Young in first plumage and in down.)

509. *Strepsilas interpres* (Linn.) Illig. Turnstone. (Downy young.)

510. *Strepsilas melanocephala* Vig. Black Turnstone. (Downy young.)

511. *Aphriza virgata* (Gmel.) Gray. Surf Bird. (Downy young.)

† [512.] *Vanellus cristatus* Meyer. Lapwing. (American specimens.)

513. *Squatarola helvetica* (Linn.) Cuv. Black-bellied Plover. (Downy young.)

† [514.] *Charadrius pluvialis* Linn. Golden Plover. (Greenland specimens; also downy young.)

515. *Charadrius dominicus* Müll. American Golden Plover. (Downy young.)

[515 *a*.] *Charadrius dominicus fulvus* (Gmel.) Ridgw. Pacific Golden Plover. (Summer adults and downy young.)

518. *Ægialites hiaticula* (Linn.) Boie. Ringed Plover. (Downy young.)

[519.] *Ægialites curonicus* (Gmel.) Gray. Little Ringed Plover. (Downy young.)

520. *Ægialites melodus* (Ord.) Bp. Piping Plover. (Downy young.)

520 *a*. *Ægialites melodus circumcinctus* Ridgw. Belted Piping Plover. (Series of adults; downy young.)

†[524.] *Scolopax rusticula* Linn. European Woodcock. (American specimens.)

†[526.] *Gallinago media* Leach. English Snipe. (Greenland specimens; downy young.)

526 *a*. *Gallinago media wilsoni* (Temm.) Ridgw. Wilson's Snipe. (Downy young.)

527. *Macrorhamphus griseus* (Gmel.) Leach. Red-breasted Snipe; Gray Snipe. (Downy young.)

527 *a*. *Macrorhamphus griseus scolopaceus* (Say) Coues. Red-bellied Snipe; Greater Gray-back. (Downy young.)

528. *Micropalama himantopus* (Bonap.) Baird. Stilt Sandpiper. (Downy young.)

529. *Tringa canutus* Linn. Knot; Robin Snipe. (Downy young.)

[533.] *Actodromas acuminata* (Horsf.) Ridgw. Sharp-tailed Sandpiper. (Summer adults and downy young.)

534. *Actodromas maculata* (Vieill.) Coues. Pectoral Sandpiper. (Downy young.)

535. *Actodromas cooperi* (Baird) Coues. Cooper's Sandpiper. (Type still unique!)

536. *Actodromas fuscicollis* (Vieill.) Ridgw. Bonaparte's Sandpiper. (Downy young.)

537. *Actodromas bairdi* Coues. Baird's Sandpiper. (Downy young.)

538. *Actodromas minutilla* (Vieill.) Bp. Least Sandpiper. (Downy young.)

†[539.] *Pelidna alpina* (Linn.) Boie. European Dunlin. (American specimens; downy young.)

539 *a*. *Pelidna alpina americana* Cass. Red-backed Sandpiper. (Downy young.)

[540.] *Pelidna subarquata* (Guld.) Cuv. Curlew Sandpiper. (Downy young.)

542. *Calidris arenaria* (Linn.) Illig. Sanderling. (Downy young.)

543. *Limosa fœda* (Linn.) Ord. Marbled Godwit. (Downy young.)

544. *Limosa lapponica novæ-zealandiæ* Gray. Pacific Godwit. (Downy young.)

545. *Limosa hæmastica* (Linn.) Coues. Hudsonian Godwit. (Downy young.)

†[546.] *Limosa ægocephala* (Linn.) Leach. Black-tailed Godwit. (American specimens; downy young.)

[547.] *Totanus glottis* (Linn.) Bechst. Green-shank. (Downy young.)

548. *Totanus melanoleucus* (Gmel.) Vieill. Greater Yellow-legs; Telltale. (Downy young.)

549. *Totanus flavipes* (Gmel.) Vieill. Yellow-legs. (Downy young.)

550. *Rhyacophilus solitarius* (Wils.) Cass. Solitary Sandpiper. (Downy young.)

†[551.] *Rhyacophilus ochropus* (Linn.) Ridgw. Green Sandpiper. (American specimens; downy young.)

552. *Symphemia semipalmata* (Gmel.) Hartl. Willet. (Downy young.)

553. *Heteroscelus incanus* (Gmel.) Coues. Wandering Tattler. (Downy young.)

[564.] *Machetes pugnax* (Linn.) Cuv. Ruff. (Downy young.)

556. *Tryngites rufescens* (Vieill.) Caban. Buff-breasted Sandpiper. (Downy young.)

559. *Numenius hudsonicus* Lath. Hudsonian Curlew. (Downy young.)

560. *Numenius borealis* (Forst.) Lath. Eskimo Curlew. (Downy young.)

†[561.] *Numenius phæopus* (Linn.) Lath. Whimbrel. (American specimens; downy young.)

[562.] *Numenius tahitiensis* (Gmel.) Cass. Bristle-thighed Curlew. (Downy young.)

563. *Phalaropus fulicarius* (Linn.) Bp. Red Phalarope. (Downy young.)

566. *Recurvirostra americana* Gmel. American Avocet. (Downy young.)

† 568. *Parra gymnostoma* Wagl. Mexican Jacana. (United States specimens; downy young.)

570. *Rallus obsoletus* Ridgw. California Clapper Rail.

571 *a*. *Rallus longirostris saturatus* Hensh. Louisiana Clapper Rail.

† 572. *Rallus virginianus* Linn. Virginia Rail. (Downy young.)

† [573.] *Porzana maruetta* (Leach) Bp. Spotted Crake. (American specimens; downy young.)

575. *Porzana noveboracensis* (Gmel.) Baird. Little Yellow Rail. (Downy young.)

576. *Porzana jamaicensis* (Gmel.) Baird. Little Black Rail. (Downy young.)

576 *a*. *Porzana jamaicensis coturniculus* Baird. Farallone Rail. (Series; also downy young.)

† [577.] *Crex pratensis* Bechst. Corn Crake. (American specimens.)

578. *Ionornis martinica* (Linn.) Reich. Purple Gallinule. (Downy young.)

581. *Aramus pictus* (Bartr.) Coues. Limpkin. (Downy young.)

582. *Grus americana* (Linn.) Temm. Whooping Crane. (Downy young.)

583. *Grus canadensis* (Linn.) Temm. Sandhill Crane. (Downy young.)

584. *Grus fraterculus* Cass. Little Crane. (Downy young.)

585. *Phœnicopterus ruber* Linn. American Flamingo. (Good adults, young, and downy young.)

† [586.] *Olor cygnus* (Linn.) Bp. European Swan. (American specimens; downy young.)

* [587.] *Olor minor* (Pall.) Bp. Bewick's Swan.

589. *Olor buccinator* (Rich.) Wagl. Trumpeter Swan. (Downy young.)

590. *Chen cærulescens* (Linn.) Ridgw. Blue-winged Goose. (Downy young.)

591. *Chen hyperboreus* (Pall.) Boie. Snow Goose. (Downy young.)

591 *a*. *Chen hyperboreus albatus* (Cass.) Ridg. Lesser Snow Goose. (Downy young.)

592. *Chen rossi* (Baird) Ridgw. Ross's Snow Goose. (Downy young.)

† [593.] *Anser albifrons* Gmel. European White-fronted Goose. (Greenland specimens; downy young.)

593 *a*. *Anser albifrons gambeli* (Hartl.) Coues. American White-fronted Goose. (Downy young.)

594 *c*. *Bernicla canadensis occidentalis* (Baird) Dall & Bann. Larger White-cheeked Goose. (Especially downy young.)

595. *Bernicla brenta* (Pall.) Steph. Brant. (Downy young.)

596. *Bernicla nigricans* (Lawr.) Cass. Black Brant. (Young in first plumage and in down.)

[597.] *Bernicla leucopsis* (Temm.) Boie. Barnacle Goose. (Downy young.)

598. *Philacte canagica* (Sevast.) Bannist. Emperor Goose. (Downy young.)

600. *Dendrocycna fulva* (Gmel.) Burm. Fulvous Tree Duck. (Downy young.)

603. *Anas fulvigula* Ridgw. Florida Dusky Duck. (Series; downy young.)

604. *Chaulelasmus streperus* (Linn.) Gray. Gadwall. (Downy young.)

[606.] *Mareca penelope* (Linn.) Selby. Widgeon. (Downy young.)

609. *Querquedula discors* (Linn.) Steph. Blue-winged Teal. (Downy young.)

[611.] *Nettion crecca* (Linn.) Kaup. English Teal. (Downy young.)

612. *Nettion carolinensis* (Gmel.) Baird. Green-winged Teal. (Downy young.)

614. *Fulix marila* (Linn.) Baird. Scaup Duck. (Downy young.)

615. *Fulix affinis* (Eyt.) Baird. Little Blackhead. (Downy young.)

616. *Fulix collaris* (Donov.) Baird. Ring-billed Blackhead. (Downy young.)

617. *Æthyia vallisneria* (Wils.) Boie. Canvas-back. (Downy young.)

619. *Clangula islandica* (Gmel.) Bp. Barrow's Golden-eye. (Downy young.)

621. *Clangula albeola* (Linn.) Steph. Butterball; Bufflehead. (Downy young.)

622. *Histrionicus minutus* (Linn.) Dresser. Harlequin Duck. (Downy young.)

623. *Harelda glacialis* (Linn.) Leach. Long-tailed Duck; Old Squaw. (Downy young.)

624. *Camptolæmus labradorius* (Gmel.) Gray. Labrador Duck. (Especially downy young.)

625. *Polysticta stelleri* (Pall.) Brandt. Steller's Duck. (Downy young.)

626. *Lampronetta fischeri* Brandt. Spectacled Eider. (Downy young.)

627. *Somateria mollissima* (Linn.) Boie. Common Eider. (Downy young.)

627 a. *Somateria mollissima dresseri* (Sharpe) Coues. American Eider. (Downy young.)

629. *Somateria spectabilis* (Linn.) Boie. King Eider. (Downy young.)

630. *Œdemia americana* Sw. & Rich. American Scoter. (Downy young.)

† [631.] *Melanetta fusca* (Linn.) Boie Velvet Scoter. (American specimens; downy young.)

632. *Melanetta velvetina* (Cass.) Baird. American Velvet Scoter. (Downy young.)

633. *Pelionetta perspicillata* (Linn.) Kaup. Surf Duck. (Downy young.)

† 635. *Nomonyx dominicus* (Linn.) Ridgw. Black Masked Duck. (Adult male with black head, and downy young.)

636. *Mergus merganser americanus* (Cass.) Ridgw. American Sheldrake. (Downy young.)

644. *Phalacrocorax mexicanus* (Brandt) Scl. & Salv. Mexican Cormorant. (Adults in nuptial plumage.)

* 648. *Phalacrocorax perspicillatus* Pall. Pallas's Cormorant.

657. *Pagophila eburnea* (Phipps) Kaup. Ivory Gull. (Downy young.)

661. *Larus leucopterus* Faber. White-winged Gull. (Downy young.)

662. *Larus glaucescens* Licht. Glaucous-winged Gull. (Downy young.)

* [665.] *Larus affinis* Reinh. Siberian Gull.

667. *Larus cachinnans* Pall. Pallas's Herring Gull. (Series, especially young and downy young.)

669. *Larus delawarensis* Ord. Ring-billed Gull. (Downy young.)

670. *Larus brachyrhynchus* Rich. Short-billed Gull. (Downy young.)

[671.] *Larus canus* Linn. Mew Gull. (Downy young.)

672. *Larus heermanni* Cass. Heerman's Gull. (Downy young.)

674. *Larus franklini* Sw. & Rich. Franklin's Gull. (Downy young.)

675. *Larus philadelphiæ* (Ord) Gray. Bonaparte's Gull. (Downy young.)

676. *Rhodostethia rosea* (Macgill.) Bruch. Ross's Gull. (Adult and downy young.)

677. *Xema sabinei* (J. Sabine) Leach. Sabine's Gull. (Downy young.)

*678. *Creagrus furcatus* (Neb.) Bp. Swallow-tailed Gull.

680. *Sterna caspia* Pall. Caspian Tern. (Young in first plumage.)

681. *Sterna regia* Gamb. Royal Tern. (Young in first plumage and downy young.)

682. *Sterna elegans* Gamb. Elegant Tern. (Young in first plumage and downy young.)

683. *Sterna cantiaca acuflavida* (Cabot) Ridgw. Cabot's Tern. (Downy young.)

684. *Sterna trudeaui* Aud. Trudeau's Tern. (All stages, but especially summer adult and young, all ages.)

688. *Sterna dougalli* Montag. Roseate Tern. (Downy young.)

689. *Sterna aleutica* Baird. Aleutian Tern. (Downy young.)

691. *Sterna fuliginosa* Gml. Sooty Tern. (Downy young.)

692. *Sterna anæstheta* Scop. Bridled Tern. (Downy young.)

694. *Hydrochelidon leucoptera* (Weisn. & Schinz.) Boie. White-winged Black Tern. (Downy young; young in first plumage; winter adult.)

695. *Anous stolidus* Linn. Noddy Tern. (Downy young; young in first plumage.)

696. *Megalestris skua* (Brünn.) Ridgw. Skua Gull. (Downy young.)

697. *Stercorarius pomatorhinus* (Temm.) Vieill. Pomarine Jaeger. (Downy young.)

698. *Stercorarius crepidatus* (Banks) Vieill. Richardson's Jaeger. (Downy young.)

699. *Stercorarius parasiticus* (Linn.) Saunders. Long-tailed Jaeger. (Downy young and melanotic specimens of adult.)

703. *Phœbetria fuliginosa* (Gmel.) Bp. Sooty Albatros. (American specimens and downy young.)

704. *Ossifraga gigantea* (Gm.) Reich. Giant Fulmar. (American specimens and young in down.)

705*a*. *Fulmarus glacialis pacificus* (Aud.) Bp. Pacific Fulmar. (Young in down.)

706. *Priocella tenuirostris* (Aud.) Ridgw. Slender-billed Fulmar. (American specimens and downy young.)

†707. *Priofinus melanurus* (Bonn.) Ridgw. Black-tailed Shearwater. (American specimens and downy young.)

†708. *Puffinus kuhli* (Boie) Bp. Cinereous Shearwater. (American specimens and downy young.)

710. *Puffinus Creatopus* Cooper. Pink-footed Shearwater. (Downy young.)

[711.] *Puffinus anglorum* Temm. Manx Shearwater. (American specimens and downy young.)

713. *Puffinus gavia* (Forst.) Finsch. Black-vented Shearwater. (Especially young in down.)

715. *Puffinus griseus* (Gm.) Finsch. Dark-bodied Shearwater. (Especially young in down.)

716. *Puffinus tenuirostris* Temm. Slender-billed Shearwater. (Series; young in down.)

†717. *Œstrelata hæsitata* (Temm.) Coues. Black-capped Petrel. (Series; young in down.)

†718. *Œstrelata bulweri* (Jard. & Selby) Coues. Bulwer's Petrel. (Series, including downy young.)

720. *Halocyptena microsoma* Coues. Least Petrel. (Series, including downy young.)

724. *Cymochorea melæna* (Bp.) Coues. Black Petrel. (Series, including downy young.)

725. *Cymochorea homochroa* Coues. Ashy Petrel. (Series, including downy young.)

*727. *Oceanodroma hornbyi* (Gray) Bp. Hornby's Petrel.

†*Fregetta grallaria* (Vieill.) Bp. White-bellied Petrel.

730. *Æchmophorus clarki* (Lawr.) Coues. Clark's Grebe. (Downy young.)

731. *Podiceps holbölli* Reinh. American Red-necked Grebe. (Young in down.)

732. *Dytes auritus* (Linn.) Ridgw. Horned Grebe. (Young in down.)

†733. *Dytes nigricollis* (Brehm.) Ridgw. Eared Grebe. (American specimens; young in down.)

736. *Colymbus torquatus* Brünn. Loon. (Downy young.)

737. *Colymbus adamsi* Gray. Great White-billed Loon. (Especially downy young.)

738. *Colymbus arcticus* Linn. Black-throated Diver. (Downy young.)

739. *Colymbus pacificus* Lawr. Pacific Diver. (Downy young.)

740. *Colymbus septentrionalis* Linn. Red-throated Diver. (Downy young.)

†741. *Alca impennis* Linn. Great Auk.

742. *Utamania torda* (Linn.) Leach. Razor-billed Auk. (Downy young.)

743. *Fratercula arctica* (Linn.) Steph. Common Puffin. (Downy young.)

*743*a*. *Fratercula arctica glacialis* (Leach) Ridgw. Large-billed Puffin.

746. *Ceratorhina monocerata* (Pall.) Cass. Horn-billed Puffin. (Downy young.)

747. *Phaleris psittacula* (Pall.) Temm. Parrot Auk. (Downy young, young in first plumage, and winter adults.)

748. *Simorhynchus cristatellus* (Pall.) Merrem. Crested Auk. (Downy young.)

749. *Simorhynchus pygmæus* (Gmel.) Ridgw. Whiskered Auk. (Adults in breeding plumage and in winter; downy young.)

751. *Ptycorhamphus aleuticus* (Pall.) Bonap. Cassin's Auk. (Downy young.)

752. *Alle nigricans* Link. Sea Dove; Dovekie. (Downy young.)

753. *Synthliborhamphus antiquus* (Gm.) Coues. Black-throated Guillemot. (Downy young.)

754. *Synthliborhamphus wurmizusume* (Temm.) Coues. Temminck's Guillemot. (Series, all stages.)

755. *Brachyrhamphus marmoratus* (Gm.) Brandt. Marbled Guillemot. (Downy young.)

756. *Brachyrhamphus kittlitzi* Brandt. Kittlitz's Guillemot. (Series, all stages, but especially downy young.)

757. *Brachyrhamphus hypoleucus* Xantus. Xantus's Guillemot. (Summer adults and downy young.)

758. *Brachyrhamphus craveri* (Salvad.) Coues. Craver's Guillemot. (Summer adults and downy young.)

*759. *Brachyrhamphus brachypterus* Brandt. Short-winged Guillemot.

*762. *Uria carbo* (Pall.) Gray. Sooty Guillemot.

## ON SEMPER'S METHOD OF MAKING DRY PREPARATIONS.*

In the Journal of the Royal Microscopical Society of London for August last it is stated that "Herr Semper recently exhibited to the Würzburg Society some zoölogical and anatomical preparations which had been prepared by a new method for dry preservation. After being hardened in a solution of chromic acid [the strength to be regulated according to the delicacy of the object and varying from one-half to one per cent.], the objects are placed in alcohol [95 per cent. will answer] to remove the water and afterwards steeped in oil of turpentine and finally dried. The tissues, while drying, are permeated by innumerable small air-bubbles, and in consequence the preparations retain their original form without sensibly shrinking, while in color they assume a white tint similar to a gypsum model. The finished preparation, which is almost pure white, and which possesses a firm, leathery consistency, may be painted with colors in parts as may be required for teaching purposes. The preparations produced were partly complete animals—mussels, annelida, and so forth—with the viscera of various vertebrate and invertebrate animals. A preparation of a cat's eye showed that, after drying, the position of the parts—the lens, ciliary processes, and so forth—underwent no change. A microscopical preparation of brain, treated on this method, proved that still simpler microscopic relations were retained after the drying—and, particularly with carmine coloring, could be distinctly recognized.

Herr v. Kölliker pointed out the advantage to be derived from this method, especially the possibility of adapting the preparations for special demonstration by painting.†

The utility of a method of preparation of this kind for moderately-sized animals, usually treated as alcoholics, will at once be apparent. It would be possible to paint the subject either in the natural colors of life, or, in the case of anatomical preparations, to indicate the parts by the use of arbitrary, conventional tints. While these preparations would be readily combustible, they would be light and absolutely free from the attacks of *Dermestes*, those well-known museum pests. As a most instructive method of making dry preparations for museum display, either of whole animals or of their anatomy, it certainly deserves a trial, as it is a much neater and cleaner method than the Wickersheimer plan, in which glycerine enters as an important element, and which would be objectionable because the object could never be thoroughly dried, but would always be sticky and disagreeable to handle and liable to soil the shelves of the museum cases. In order to make the preservation effectual, after dehydration in 95 per cent. alcohol, which is strong enough for the purpose, the preparation ought to be allowed to become thoroughly saturated with the oil of turpentine; the time which it will take to do this will of course depend upon the size and thickness of the object treated. The principle involved in this method is the same as that applied in making balsam or damar preparations on slips for the microscope, only that after dehydration is effected oil of cloves is used to make the object transparent instead of turpentine, although the latter is also used. The preparation is then covered with a drop of balsam and the cover-glass put on, when you have a specimen that, with a little care, will last a lifetime. The Semper is simply the microscopic method adapted to large objects which could not be mounted upon slides, and I see no reason why they should not be equally as durable as microscopical balsam preparations. It is equally important that the strong alcohol should completely saturate the specimen, else the turpentine will not find its way into all parts of it so as to render it indestructible when dry. Two or three hours would probably suffice for the saturation with alcohol or turpentine of moderately large specimens. The hardening in the chromic acid solution would require from 12 to 24 hours, according to the size of the object. This method is also free from the objection which applies to Wickersheimer's, that there are no corrosive metallic poisons used.

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* Abstract, with remarks by J. A. Ryder.

† Verhandl. Phys.-Med. Gesell., Würzburg, XV, 1881, S. B. IX.

By placing the vessel containing the preparation as immersed under an air pump, the penetration of the liquids will be facilitated.

## NOTES ON A COLLECTION OF FISHES, MADE BY LIEUT. HENRY E. NICHOLS, U. S. N., ON THE WEST COAST OF MEXICO, WITH DESCRIPTIONS OF NEW SPECIES.

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

During the autumn of 1880 a cruise along the west coast of Mexico and Central America was made by the U. S. Coast and Geodetic steamer Hassler. Lieut. Henry E. Nichols, the officer in command, took much pains to make collections of fishes whenever they were obtainable. As a result of his labors we have the small but extremely valuable collection noticed in the present paper. It will be observed that twelve of the specimens came from the Revillagigedo Islands, in the open sea to the westward of Mexico, a locality where no collections of fishes had been previously made by any one. Six of these specimens belong to species new to the fauna of North America.

We give an enumeration by localities of the species in the entire collection, with the number borne by each specimen on the records of the United States National Museum.

### A.—*Whaler's Bay, Guadalupe Island, Lower California.*

1. PSEUDOJULIS MODESTUS (Girard) Gthr.
2. PSEUDOJULIS MODESTUS (Grd.) Gthr. (No. 28,391 U. S. Nat. Mus.)

### B.—*Sulphur Bay, Clarion Island.*

3. **CARANX ORTHOGRAMMUS** sp. nov. (No. 28,345 U. S. Nat. Mus.)

Allied to *Caranx ferdau* and *C. gymnostethoides;* species with nearly straight lateral line, many-rayed dorsal and anal, and feeble teeth.

Body elliptical, compressed, the back regularly but not strongly arched, the ventral outline forming a rather even but less convex curve. Head longer than deep, rather pointed in profile, its median ridge somewhat elevated. Mouth low, oblique, the maxillary extending to nearly opposite front of pupil, its length 2⅓ in head; lower jaw slightly projecting.

Teeth all equally minute, in villiform bands on jaws, vomer, palatines, and tongue. Eye large, broader than preorbital, its diameter 1½ in length of snout, 4⅔ in head. Adipose eyelid little developed. Cheeks and temporal region with fine scales; rest of head naked.

Scales rather small, those below pectorals smaller; a naked area on breast, becoming wider forwards from base of ventrals. Lateral line almost straight, slightly undulated and curved upwards above pectorals, becoming straight by almost imperceptible degrees opposite lobe of anal. Greatest depth of the arch less than diameter of pupil; the length of straight part less than that of the curve. Plates developed only on the posterior third of the straight part; the plates small, with low keels, their spines little prominent; 15 to 18 plates developed, including small ones, in front of which are about 40 ordinary scales on the straight portion of the lateral line.

Spinous dorsal very small, of three weak spines slightly connected by membrane, the highest spine not longer than diameter of pupil (these spines, probably, more numerous and larger in young examples) Soft dorsal long and low, with slender rays; a well-developed scaly basal sheath anteriorly. Elevated rays in front a little more than one-third the base of the fin, a little more than half length of head; anal shorter than dorsal, its anterior lobe equally high, and with a similar basal sheath. Free anal spines obsolete in typical specimen. Caudal lobes moderate, equal, as long as head, their length equal to the depth of the fin from tip to tip. Pectoral fin falcate, its tip very slender, reaching eighth ray of anal, its length 2½ in body. Ventrals short, 2½ in head.

Head 2¾ in length to base of caudal; depth 3⅔.

Fin rays: D. III–I, 32. A. II–I, 26.

Coloration in spirits, smutty olivaceous, everywhere irregularly clouded with darker, the belly scarcely paler than the back; opercular spot obsolete. Dorsal, anal, posterior border of caudal, and tips of ventrals blackish; fins otherwise dull olivaceous.

A single specimen of this species, 16 inches in length, was obtained by Lieutenant Nichols, at Sulphur Bay, Clarion Island, off the west coast of Mexico.

It is certainly very close to *Caranx ferdau* (Günther, Fische Sudsee, ii, 134, taf. 87, 88), but it seems to differ in color and in the armature of the lateral line.

4. CARANX LUGUBRIS* Poey. (No. 28,375 U. S. Nat. Mus.)

Body oblong-ovate, compressed, deep, the back elevated, but not arched. Profile gibbous from the occiput forward to above eye, thence straight and steep at a considerable angle to a point in front of nostrils, whence the snout again projects at a strong angle. Outline of back nearly straight from the occiput to the front of the second dorsal, thence declining regularly to the caudal peduncle. Ventral outline nearly straight from the lower jaw to the origin of the anal, the base of which is placed at a similar angle to that of the soft dorsal.

Head large, very deep, deeper than long; occipital ridge not sharp. Mouth large, the broad maxillary reaching to opposite front of pupil. Lower jaw strong, the chin projecting when the mouth is closed. Teeth in the upper jaw in a narrow villiform band, with an outer series of larger, conical teeth, six to eight in number on each side, subequal and regularly arranged. Lower jaw with a single series of teeth similar to the larger teeth of the upper jaw, a few smaller teeth intermixed with them. No differentiated canine teeth. Villiform teeth on vomer, palatines, and tongue. Gill-rakers rather long, close-set, three-fifths diameter of eye. Eye large, with a distinct adipose eyelid, its diameter equal to that of the broad preorbital, which is wider than the maxillary, 4½ times in length of head.

Cheeks closely scaled; opercles mostly naked below; a few scales on subopercle and interopercle. Scales on body not very small; breast closely scaled. Lateral line with a moderate curve anteriorly, becoming straight at front of anal; the length of the arch being less than two-thirds that of the straight part; greatest depth of the arch about one-fifth its length. Armature of lateral line beginning at the curve; the plates rather large, very broad, twenty-eight in number. Fins with very few scales or none.

Spinous dorsal moderate, the spines rather strong, its last spine stout and free, nearly horizontal. Second dorsal falcate, the longest rays more than half the length of its base. Posterior part of the fin rather low, rising well above its low basal sheath of scales which terminates near the middle of the fin; anal similar to soft dorsal, its anterior rays more than half the base of the fin. Free anal spines moderate. Caudal lobes rather broad, equal, not very long, the upper as long as from snout to edge of opercle; depth of the fin from tip to tip, about equal to depth of head. Ventral fins short, not filamentous, as long as from snout to end of maxillary. Pectoral extremely long, falcate, reaching to the tenth plate of the lateral line, or about to seventh anal ray, its length 2¾ in that of body, less than than the greatest depth of the body.

Fin rays: D. VII-I, 21. A. II-I, 18.

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* *Caranx ascensionis* Günther, Fische der Sudsee ii, 132, taf. 85 = *Caranx ascensionis* Cuv. & Val. ix, 102: evidently not *Scomber ascensionis* Osbeck, which is pale in color, and with D. VIII-25; A. 25.

Head 3⅓ in length to base of caudal; greatest depth 2⅗.

Color sooty blackish, nearly uniform, the belly not paler than the back. A black spot at angle of opercle, none on pectoral. Ventrals, anal and dorsal wholly black, as are the shields of the lateral line.

The single specimen of this species (No. 28,385) 18 inches in length, was obtained by Lieutenant Nichols, at Sulphur Bay, Clarion Island, off the west coast of Mexico. It seems to be identical with the fish figured by Dr. Günther (Fische Sudsee, taf. 85) as *Caranx ascensionis*, from Kingsmill Island, but the orignal *Scomber ascensionis* of Osbeck is evidently a different species.

### 5. BALISTES MENTO sp. nov. (No. 28,387 U. S. Nat. Mus.)

Body oblong, elliptical, slightly heaviest forward; dorsal and ventral outlines similar, neither much arched. Body not strongly compressed, its greatest thickness a little less than half its greatest depth. Mouth very small, terminal, higher up than usual, nearly in the line of the axis of the body, the chin protruding beyond it; width of the mouth from angle to angle about equal to the diameter of the eye. Lower jaw the longer, its teeth slightly directed backward; upper jaw with its teeth directed slightly forwards, shutting outside of the lower teeth. Teeth pale brownish, somewhat unequal; lower teeth wedge-shaped, broadest and nearly truncate at tip; teeth of the upper jaw obliquely truncate, slightly emarginate, the outer angle pointed and projecting. About eight teeth in the outer row; the mouth so closely shut that the inner row cannot be seen.

Eye small, high and well back, its diameter contained nearly twice in the interorbital width, 3 in snout. A groove in front of eye below the nostrils, about as long as the diameter of the eye. Five narrow grooves on the cheek below the eye, extending from near the mouth backward toward the base of the pectoral.

Height of gill-opening slightly greater than diameter of eye, its lower edge opposite middle of pectoral.

Scales of body comparatively small, not very rough. Scales of belly somewhat reduced in size, arranged in oblique series running downward and backward from the pectoral region, these forming a contrast in direction with the scales of the sides. Scales on caudal peduncle without keel or spines, similar to those on rest of body; scales on posterior portion of sides slightly carinate, forming low ridges along the rows of scales. Gill-opening surrounded by small scales and without larger plates.

First dorsal spine very robust, placed somewhat behind eye, its height a little more than twice diameter of eye, the deep dorsal groove as long as the spine. Second spine short and slender, its length about equal to diameter of eye. *Third dorsal spine wholly wanting.*

Soft dorsal rather high, its longest rays more than half the length of the base of the fin, 1⅔ in head; anal similar, its base a little shorter, a few series of small scales covering the base of each fin; caudal moderate, lunate, its depth from tip to tip more than its length, and 1¼ times in length of head. Caudal peduncle subterete, deeper than broad. Ventral spine slightly movable. Pectoral short, rounded, less than half length of head.

Head 3½ in length; depth 2⅖.

Dorsal rays II–I, 29. Anal I, 26.

Lat. l. 37; 23 scales in an oblique series upward and forward from front of anal.

Coloration in spirits, dark olive above, rather pale below, the skin between the scales somewhat darker; scaly basal part of dorsal and anal abruptly black; membrane of these fins yellowish, the tips dusky. Scaly base of caudal dark brown, the medial part lighter brownish; a lunate band at tip yellowish; pectorals olivaceous.

One specimen of this species, 10½ inches long, was taken by Lieutenant Nichols at Clarion Island. It differs from all the known species of *Balistes* in the presence of but two spines in the dorsal. If this be not an accidental variation, the species should probably be taken as the type of a distinct genus. The small high mouth gives a somewhat peculiar physiognomy.

### C.—*Braithwaite Bay, Socorro Island.* (*Taken with hook.*)

6. EPINEPHELUS SELLICAUDA Gill. (28,213.)
7. EPINEPHELUS SELLICAUDA Gill. (28,237.)
8. DERMATOLEPIS PUNCTATUS Gill. (28,214.)
9. DERMATOLEPIS PUNCTATUS Gill. (28,223.)
10. PIMELEPTERUS LUTESCENS sp. nov. (No. 28,371, U. S. N. M.)

Body oblong-elliptical, robust; the dorsal and ventral outlines moderately and nearly equally arched. Head bluntish; the profile evenly curved, without depression in front of the eye; the preorbital region less gibbous than in *P. bosci.* Mouth terminal, the lower jaw slightly the shorter, the broad maxillary reaching to opposite the front of the eye, its width about equal to that of the preorbital.

Teeth in both jaws broad, rounded or subtruncate, in single rows, the horizontal roots longer than the crown, but not twice as long; about 36 teeth in each jaw. Behind the large teeth in each jaw is a band of rasp-like asperities. Gill-rakers short.

Preopercle with its angle rounded and membranaceous, the vertical limb straight and minutely serrulate. Cheeks with four rows of large scales, besides several series of smaller ones. Preorbital, jaws, snout, rim of eye, and rounded part of preopercle naked; the head otherwise closely scaly.

Scales on body rather small, firm, smoothish; those on breast smaller; fins, as usually, with the soft parts covered with small scales.

Dorsal spines rather high and strong, the middle ones highest, higher than the soft rays, nearly twice the height of the last spine, and half the length of the head, 3⅖ in greatest depth of body. Soft dorsal rather high, not at all falcate, the first rays two-fifths the length of the head.

Anal fin similar, shorter and higher, the spines graduated, the longest rays more than half length of head.

Caudal wide, moderately forked, the lobes equal, the longest a little longer than head; the depth of the fin, from tip to tip, about equal to greatest depth of body. Pectorals short, slightly longer than ventrals; as long as from snout to edge of preopercle. Ventrals placed well behind pectorals, not reaching vent.

Head 3⅔ in length; depth 2¼.

Dorsal rays, XI, 11; Anal, III, 11. Scales, 12–67–22.

Coloration in spirits nearly uniform light grayish, without distinct markings; golden yellow in life, according to Lieutenant Nichols; very faint darker streaks present along the rows of scales. Preorbital, suborbital, and preopercle bright silvery; lower jaw silvery; both jaws dusky at tip. Fins all pale. A very obscure darker blotch in front of base of pectoral.

One specimen, about 15 inches in length, taken by Lieutenant Nichols at Braithwaite Bay, Socorro Island. It differs from *P. bosci*, in form, in color, and in the greater development of nearly all the fins.

11. CARANX MELAMPYGUS Cuv. & Val. (No. 28,355 U. S. N. M.)

Body oblong-ovate, compressed, the back arched, the profile not steep, the curve from snout to dorsal being a nearly regular arc; ventral outline nearly straight from the chin to front of anal, where an angle is formed with the ascending base of the anal.

Head moderate, compressed, not blunt in profile, the occiput and interorbital region elevated and considerably carinated. Mouth moderate, low, oblique, the lower jaw prominent, scarcely projecting beyond upper; maxillary barely reaching to opposite the front of the small eye. Upper jaw with a band of villiform teeth, in front of which is a row of strong teeth, about ten on each side, the anterior largest, larger than in most species, but hardly canines. Lower jaw with a single row of rather large teeth, irregularly placed, much smaller than the larger teeth of the upper jaw; villiform teeth on vomer, palatines, and tongue. Eye small, placed high and far back; adipose eyelid small. Diameter of eye 2 in length of snout, 1¼ in the depth of the broad preorbital, 2½ in the post-orbital part of head, and 2 in interorbital area. Cheeks and upper part of opercles with small scales; rest of head naked. Gill-rakers long and strong, as long as eye.

Scales rather small; breast closely scaled; lateral line not strongly arched, becoming straight opposite front of anal, its curved part 1⅔ in length of straight part. Plates on anterior portion of straight part scarcely different from ordinary scales; those on posterior portion moderate, with high keels and appressed spines; 37 plates in all, counting from beginning of straight part.

Spinous dorsal moderate, the spines slender, rather high. Procumbent dorsal spine obsolete. Soft dorsal low, falcate in front, the longest ray little more than half the base of the fin, or 1½ in length of head.

Anterior part of the fin with a distinct scaly basal sheath, which becomes obsolete at about the 14th ray. Anal fin similar to soft dorsal, a little shorter and lower, its scaly sheath more developed; free anal spines moderate. Caudal fin widely forked, its lobes subequal, 1⅓ in head; distance from tip to tip more than the length of either lobe. Pectorals long and falcate, their tips reaching sixth anal ray, longer than head, and a trifle less than greatest depth of body. Ventrals short, one-third length of pectorals.

Coloration in spirits olivaceous; dark above; pale below, but nowhere silvery; top of head clear olivaceous; opercular spot obsolete; lower jaw soiled golden; no pectoral spot; base of pectoral somewhat dusky; small irregular dark brown spots, smaller than the pupil and irregular in size, scattered without order over the body, rather most numerous about the pectorals. Caudal fin dusky, especially on its posterior edge; dorsal and anal dusky, their lobes black; ventrals dusky at tip; pectorals olivaceous.

Head 3½ in length (without caudal); greatest depth, 2¾; pectoral, 2⅘; length of type, 20 inches.

Fin rays: D. VIII–I, 22. A., II–I, 19.

A single example of this species was taken by Lieutenant Nichols, with a hook, in Braithwaite Bay, Socorro Island, off the west coast of Mexico. It agrees very closely with the description and figure of *Caranx melampygus* given by Günther (Fische Sudsee ii, 133, taf. 86.)

12. PLATYGLOSSUS NICHOLSI sp. nov. (No. 28,218 U. S. N. M.)

A species of the ordinary type, without sharp markings of any kind. Body rather deep; the profile steep, evenly curved; the snout moderately pointed. Teeth strong, the posterior canines especially so. Head entirely naked; scales on breast not much reduced. Dorsal spines very slender, flexible. Pectoral fin 1⅗ in length of head, reaching as far as the slender tips of the ventrals. Caudal fin rounded, its angles not at all produced.

Coloration in spirits, plain olivaceous above, sides brownish, belly paler; an obscure dusky bar across middle of spinous dorsal and extending down the sides; some of the scales of back with dark lines. Soft dorsal and anal fins with not very numerous small, round dark spots, especially posteriorly; otherwise plain; spinous dorsal dusky. The coloration may have been bright in life, but there could never have been any sharp markings.

Head 3½ in length; depth 3½.

D. IX, 12. A. III, 11. Scales 2–28–8.

This species is known to us from a single example, 10½ inches long, taken by Lieutenant Nichols at Braithwaite Bay, Socorro Island. It is readily distinguished from the only two members of the genus thus far discovered on the western coast of tropical America, *P. dispilus* Günther, and *P. semicinctus* (Ayres). It is impossible, from descriptions alone, to compare it satisfactorily with the numerous West Indian and East Indian species of the genus, but, as all are local in their range, ours is probably a species different from any of them.

### D.—*San Blas, Mexico.*

13. POMADASYS FURTHI (Steindachner.) J. & G. (28,225.)
14. LUTJANUS PRIETO Jor. & Gilb. (Mss.). (28,253.)
15. CENTROPOMUS PEDIMACULA Poey.
16. GERRES AXILLARIS Gthr. (28,255.)

### E.—*Acapulco, Mexico.*

17. EPINEPHELUS ANALOGUS Gill. (28,235.)
18. POMADASYS LEUCISCUS (Gthr.) J. & G. (28,257.)
19. LUTJANUS CAXIS (Bloch.) Poey. (28,254.)
20. CYNOSCION RETICULATUM (Günther) J. & G. (28,250.)

### F.—*Porto Escondido, Mexico.*

21. PIMELEPTERUS ANALOGUS Gill. (28,270.)

This species is closely related to *P. bosci* Lac., differing in the larger scales and greater depth of the body.

22. CARANX CABALLUS Gthr.
23. TRACHYNOTUS FASCIATUS Gill.
24. MUGIL BRASILIENSIS Ag. (28,244.)

### G.—*Salina Cruz, Mexico.*

25. CENTROPOMUS ROBALITO Jor. & Gilb. (Mss.) (28,245.)
26. GERRES RHOMBEUS C. & V.
27. DORMITATOR MACULATUS (Bloch) Gill.
28. PHILYPNUS LATERALIS Gill. (28,252.)
29. PHILYPNUS LATERALIS Gill. (28,269.)
30. CHANOS SALMONEUS (Forst.) C. & V. (28,240.)

### H.—*La Union, San Salvador.*

31. CYNOSCION SQUAMIPINNE (Günther) Streets. (28,260.)
32. SCIÆNA ALUTA* sp. nov. (No. 28,129 U. S. N. M.)

Allied to *Sciæna chrysoleuca* (Günther).

Form rather elongate, the back a little elevated and compressed; caudal peduncle especially long and slender. Head rather broad above the eyes, somewhat depressed, so that the anterior profile is a little concave, in front of which the snout is rather abruptly truncate. Interorbital space a little broader than the large eye, the diameter of which is about equal to the length of the snout, and contained about four times in the length of the head. Width of preorbital two-fifths the diameter of the eye. Preopercle strongly serrated, the three lowest serræ radiating, the lowest and largest one turned downward and forward. Lower jaw included, considerably shorter than upper. Snout scarcely projecting beyond premaxillaries. Mouth nearly horizontal; premaxillary much below the level of the eye; maxillary extending to just beyond middle of eye. Teeth in both jaws in narrow villiform bands, the outer teeth in the upper jaw somewhat enlarged; those in the lower jaw all small. Sides and top of head somewhat cavernous, the surface yielding to the touch. Gill-rakers shortish, rather slender, about as long as pupil. Pseudobranchiæ large.

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*αλουτος, unwashed.

Dorsal fin divided nearly to base, the spines not very high, rather flexible, the longest little more than half length of head; second spine a little stouter than third, and nearly as high. Second dorsal rather low. Second anal spine strong, about half length of head, three-fourths height of the soft rays; distance from front of anal to caudal 1¾ in length of body; distance from vent to anal a little more than half length of second anal spine. Caudal fin long, double truncate, the middle rays produced, as long as from snout to edge of preopercle; caudal peduncle (from end of anal) 1⅕ in head; anal ending in advance of end of dorsal, its first spine in advance of middle of soft dorsal. Ventrals long, the second ray filamentous, reaching vent. Pectorals rather short, as long as caudal.

Scales large, those on breast not much smaller. Soft parts of vertical fins scaly toward the base.

Lower pharyngeals narrow, with small, slender, pointed teeth, those of the series on the inner edge of the bone much enlarged, also very slender.

Head 3⅖ in length to base of caudal; greatest depth, 3¼.

D. X–I, 18. A. II, 8. Lat. l., 44; 5 scales in a vertical series from front of dorsal to lateral lines.

Color light reddish brown, dingy with dark punctulations. Ground color a light coppery shade, little silvery; each scale with many dark points and a smutty edging; the general hue the same above and below; no distinct markings. Preorbital of a soiled silvery. Fins similarly dusky, the caudal yellowish, the anal almost black. Inside of opercle dusky.

This species is known to us from one specimen, 7½ inches in length, numbered 28,129 on the National Museum Register. It was collected at La Union, on the Gulf of Fonseca, in San Salvador, by Lieut. H. E. Nichols.

33. MUGIL BRASILIENSIS Ag. (29.644.)

34. ÆLURICHTHYS PANAMENSIS Gthr. (28,192.)

INDIANA UNIVERSITY, *November* 5, 1881.

## REPORT ON THE CONTENTS OF TWO BOTTLES OF WATER FROM THE GULF OF MEXICO, FORWARDED BY THE SMITHSONIAN INSTITUTION.*

### By DR. W. G. FARLOW.

When received in Cambridge, May 14, 1881, the water of both bottles gave out an excessively disagreeable odor of putrefying organic matter, and ammonia was given off in considerable quantities, as was shown by holding a rod moistened with hydrochloric acid over the mouths of the bottles. In one bottle there was a greenish-colored, slimy deposit an inch deep, and the water above was clear. In the second bottle the water was turbid throughout and of rather a brownish color.

The microscopic examinations showed that the contents of the two bottles were alike. The greater portion of the matter contained in the water consisted of a mass of amorphous slime, in which were numerous crystals, apparently of a fatty nature. There were, besides, a large quantity of eggs of some animal, which were easily recognized, although partially decomposed, and the remains of small crustacea. In addition to the animal substances mentioned were remains of plant tissues, leaves and young stems, pine pollen, and diatoms of four or five different species.

From what has been said, it is evident that the slime in the water must have been at some time not far from the land, or else that the bottles used, or the water after it had been collected, must have been exposed to the air for some time.

It is my opinion that the trouble is not caused by the presence of any vegetable substance, but that the presence of the latter is accidental. The slimy mass probably originated from a mass of eggs which, for some reason or other, were killed near the surface of the water, and the smaller crustaceans in the neighborhood have been involved in the general mass of slime.

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## REMAINS OF THE WALRUS (?) IN MAINE.

### By C. H. BOYD.

ADDISON POINT, WASHINGTON COUNTY, MAINE,
*October* 8, 1881.

DEAR SIR: I have the honor to make the following statement of finding the partly fossilized bones of a walrus (?), in expectation that it may possibly prove of interest in connection with investigations of the Smithsonian, as tending to show the range of the walrus thus far south, or that this climate was more Arctic in time past.

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* This water was collected where the fish mortality, referred to in preceding pages, was the greatest.

Yesterday, hearing that the bones of a large animal were washing out of a clay bank at Reef Point, on the eastern side of the Pleasant River, 3 miles below this village, I visited the spot to see some of the remains *in situ*. I then dug out several pieces of rib and a forearm.

The Point, which is in cultivation, is 15 feet above high water, and has been washing away for many years. Mr. Oliver Look, the owner of the property, informs me that it has washed off 100 feet within the last sixty years. He also showed me a tusk with a portion of the socket attached, which he dug out here a few days since, and from which I judge the remains to be those of a walrus. I inclose a rough sketch and also a small piece of scale from the tusk that came off in my hand while making the sketch. These bones are in stiff blue clay about 2 feet above high water in a nearly vertical bank, there being 6 feet of the clay above them and above that some 6 feet of gravel and soil.

Nearly opposite, on the west side of the bay, I found a kitchen midden, now covered with a growth of hard wood. From it I obtained, by digging, three pieces of chipped flint and a bear's tooth.

The exact location of both these "finds" can be obtained, if desired, from our topographical sheet now in progress, by application to Professor Hilgard, assistant in charge of the Coast and Geodetic Survey.

Very respectfully, your obedient servant,

C. H. BOYD,
*Assistant, C. and G. Survey.*

Prof. SPENCER F. BAIRD,
*Secretary Smithsonian Institution.*

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## DIRECTIONS FOR COLLECTING AND PRESERVING FISH.

### By TARLETON H. BEAN.

1. Wash the fish thoroughly in water, to remove the slime and dirt that are almost invariably present upon them, not omitting the inside of the mouth and the gills. In cleansing fish that have a tough, scaleless skin, or such as have the scales firmly fixed, use a stiff paint brush or a scrubbing brush; for thin-skinned fish and such as have deciduous scales, a softer brush must be taken. Some fish are covered plentifully with tenacious mucus that is with great difficulty removed by water alone; in such cases a solution of two tablespoonfuls of alum in a pint of lukewarm water will be found efficacious.

2. It is often necessary to preserve fish that are stale, or partially digested, and offensive to the smell. Such examples may be thoroughly disinfected by the use of the disinfecting solution of chloride of soda. Use a tablespoonful of the solution in one pint of water. With this wash the gills, and pour it into the mouth and stomach, allowing it to return by the mouth.

3. Inject alcohol in the mouth and the vent, to preserve the viscera. Make small incisions in the belly and in thick parts of the body, to allow the alcohol to penetrate the tissues. It is nearly always desirable to remove the liver, stomach, and intestines from large fish, and to preserve these separately, numbering them so as to correspond with the fish from which they are taken.

4. It is a good plan to keep freshly collected fishes in weak alcohol for a day or two; a mixture of two parts of 95 per cent. alcohol to one of water will answer for this temporary immersion. Some species are exceedingly soft and flabby, falling to the bottom of a glass jar or other receptacle, becoming partly imbedded in their own mucus, and rapidly disintegrating in consequence. Such specimens should either be suspended in the alcohol by a thread or string from the neck of the jar or the hook sometimes found on the inside of the stopple, or a bed of excelsior or muslin should raise them from the bottom; these are necessary precautions which will prevent many losses. After the fish have been kept for not more than two days in the weak alcohol, transfer them to a mixture of three parts of 95 per cent. alcohol to one of water. Ordinarily this latter will preserve specimens that are not crowded too much at least three months; some, of course, will remain in good condition still longer; but, generally, three months will reduce the preservative power of the liquid so far as to make a renewal of alcohol necessary. The tendency with many collectors is to overcrowd specimens, and, as a result, museums frequently receive a lot of half-rotten material which is too valuable to be thrown away and is yet always a source of trouble and disappointment. A jar, tank, or case of any kind should never be expected to accommodate more than half its own bulk of fish, and even this proportion will require watchfulness to avoid loss If a collection freshly caught is to be shipped to a distant museum or private collection, observe the directions about cleansing the fish and preserving the viscera separately if needful, and then use nothing weaker than a mixture containing three parts of 95 per cent. alcohol and one part of water. A good mixture which will carry fish in very nice condition is the following: 95 per cent. (or absolute) alcohol, 3 quarts; water, 1 quart; glycerine, 1 pint; borax, 1 ounce. There is nothing better, however, than the mixture of three parts of alcohol and one of water.

5. The extensive collections of the United States Fish Commission are usually packed in copper tanks, which are tin-lined within. The lid of the tank is made to screw in the top and its diameter is always as great as the dimensions of the top will allow. The tanks (called Agassiz tanks) are made to contain 4, 8, or 16 gallons. Strong chests, of a size large enough to accommodate a 16-gallon tank, are used for shipping; the hinges and hasps of these chests are riveted on; handles are screwed on at the sides, and each chest is furnished with a strong lock. The chest may contain one 16-gallon tank, or two of 8 gallons, or four of 4 gallons, or one of 8 gallons and two of 4 gallons, as may best

suit the convenience of the collector. When several tanks make up the complement it is usual to separate them by thin wooden partitions.

Cases made of ordinary tinned sheet-iron are much more generally used than the expensive copper cans, and they will answer well enough if the joints are perfectly tight and the top is securely soldered on.

Oak kegs, holding about 10 gallons each and provided with iron hoops, are capital containers for large fishes, and they will stand the wear and tear of railway travel better than most other receptacles.

Glass preserving-jars may be shipped long distances with comparative safety, but they must be tested, by inverting them, to insure tightness; the top of the jar and the rubber band should be wiped dry; wrap the jars in strong paper and pack them in some material that will prevent breakage.

When corked bottles are used, tie a piece of bladder securely over the cork. Where seals and sea-lions occur, the throat, as prepared by the Aleuts for example, will be found an excellent covering. It is necessary to wet the membrane to make it pliable. Whenever jars, bottles, or any other small containers are filled with fish which are not provided with tin tags, write plainly with a lead-pencil on heavy manila or writing-paper the name of the place where the fish were taken, the date of capture, and the name of the collector. Put a label of this kind inside of each bottle; it will remain legible for years.

6. Each specimen should be provided with a numbered tin tag, which is to be fastened, whenever possible, by means of a string passed through the right gill-opening and out at the mouth. When the string *must* be tied around the body or tail of the fish it should be fixed securely and yet without injuring any of the fins. A catalogue is to be kept by the collector, in which the numbers corresponding with those on the tags must be entered, with notes as to place, time, and mode of capture, and other particulars which will be more fully mentioned further on. Wrap each fish separately in common coarse muslin (the coarser the better), and tie the ends securely. Do not tie the string so tightly around the body of the fish as to make furrows and wrinkles in the skin. If tin tags are not at hand, a label written firmly on stout paper with a lead-pencil should be wrapped inside of the covering of the fish. It is necessary always to fill the receptacle in which specimens are packed—a bottle or jar may be either filled with alcohol or the specimens may be wrapped in muslin. It is not a good plan to put tow, excelsior, or cotton-wool on top of fish, as it presses them close together and prevents the free circulation of alcohol between them. For long journeys it is desirable to secure better protection than the muslin wrapping alone affords. This may be gained by placing beds of excelsior or thin wood shavings between the layers of fish and at the bottom and top of the case.

A plainly-written card placed at the top of the box, so as to be seen when the lid is removed, telling its contents and by whom it was sent, will save much trouble when the collection is to be unpacked.

7. Notes of color, taken from the fresh specimens, should be sent with them if the fish are to be described in the museum. The collector should also preserve in his own books a record of life-colors under the catalogue numbers corresponding with the tin tags fastened on his fish. He can then obtain the identification of his species by their numbers and publish his studies upon them at his own pleasure.

8. Local names of fish should always accompany the specimens when obtainable.

9. It is desirable to know whether or not the species is abundant; whether different sizes of the same fish are found; whether they associate in schools or not; whether they are permanent residents or migratory; if migratory, by what routes they come and go; whether they form an important article of food; what they feed upon and what species prey upon them; the depth and character of the bottom on which they occur; the mode of capturing them; the uses made of them and the various products which they go to form, in short, everything bearing upon the life history or the economic applications of the species should be noted in detail.

10. Before washing the fish look them over for external parasites; examine the gills and the inside of the mouth carefully, as these are favorite situations. These parasites often furnish a clue to the migrations of the fish; remove them if they can be taken off entire, if not, let them remain, and call attention to their presence in your shipping notes. Preserve the parasites in vials or bottles, and provide them with labels stating from what fish they came and in what situation they were found.

To preserve fish indefinitely in glass jars, observe the following directions: first, select a jar of the proper size to accommodate the specimen amply, without bending or distorting it in any way; put in the fish with the tail down in nearly all cases; the tail may often rest upon the bottom of the jar, or the fish may be suspended from the hook which is now found in the stopple of the modern museum jars; cover the fish completely with the alcoholic mixture referred to in the closing sentence of paragraph 4; discoloration of the alcohol is a sign that its preservative power is weakened and calls for a renewal; fishes in alcohol will never make a good show unless the liquid is kept clear and clean. A label giving the name of the fish, place of its capture, and name of its captor, should be tied on the neck of the jar by means of a piece of narrow tape passed through holes punched in the ends of the paper. The jars must have accurately ground glass stopples. It is best to use no kind of sealing wax to coat the joint of the stopple; simply wipe the glass perfectly dry, close the jar properly, and there will be little danger of evaporation. Do not let the direct sunlight strike your jars, and keep them well removed from stoves, registers, and the like.

# A PRELIMINARY CATALOGUE OF THE FISHES OF ALASKAN AND ADJACENT WATERS.

### By TARLETON H. BEAN.

The following is a list of the fishes of Alaska which have been recorded in the principal works relating to the subject. One hundred and sixteen species are named, all of which are in the collection of the United States National Museum except *Pleuronectes Franklinii*, *Murænoides dolichogaster*, *Sebastichthys ruber* (represented by numerous examples from California and Puget Sound), *Psychrolutes paradoxus*, *Esox lucius*, *Spratelloides bryoporus*, and *Raia batis* of Pallas. The catalogue is, therefore, practically a record of what the Museum has from the Territory. The numbers preceding the localities of the species refer to the Museum register of fishes.

The earlier collections here mentioned were made principally by Messrs. Bannister, Bischoff, Dall, Elliott, Kennicott, and Turner. More recent contributions have been received from Commander L. A. Beardslee, U. S. N., at Sitka, Capt. C. L. Hooper, United States Revenue Marine, in the Arctic, and Mr. William J. Fisher, United States Coast Survey observer, at Kodiak. As will be seen by referring to the list, very large additions were made during the summer of 1880 by Mr. William H. Dall, commanding the United States Coast Survey schooner Yukon, his assistants, and the writer.

The species named are almost wholly shore species, or such as are found in comparatively shallow water; the deep-water fishes of Alaska are still undiscovered, instruments of deep-sea research, except the dredge, not having been employed there.

In the appendix will be found the names of 99 species which have been recorded from waters adjacent to Alaska, many of which will doubtless be found within the limits of the Territory.

For the sake of convenience, the numbers preceding the names of fishes in the faunal tables are the same as in the catalogue.

It is my intention to prepare a detailed account of the fishes here recorded, and it is expected that at least the new species will be represented by illustrations.

## GASTEROSTEIDÆ.

1. **Gasterosteus cataphractus** (Pall.) Tilesius.

Kamtchatka (Pallas); San Francisco and Puget Sound (Jordan & Gilbert).

20489. Sitka. J. A. Fitzgerald.
28053. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
28077. Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.
27994. Chugachik Bay, Cook's Inlet, July 1, 1880. Dall & Bean.

28069. Chugachik Bay, Cook's Inlet, July 2, 1880. T. H. Bean.
28068. ♀ St. Paul, Kodiak, July 10, 1880. Dall & Bean.
23989. Sanborn Harbor, Unga Island, Shumagins. W. H. Dall.
28074. Unga Island, Shumagins, July 18, 1880. E. P. Herendeen.
28026. Humboldt Harbor, Shumagins, July 20, 1880. E. P. Herendeen.
28094. Little Koniushi Island, Shumagins, July 16, 1880. W. H. Dall.
27965. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
23987. Unalashka. W. H. Dall.
23953. Amchitka. W. H. Dall.
24068 (1039). Amchitka, July, 1873. W. H. Dall.
23968. Kyska Harbor. W. H. Dall.
23988. St. Paul Island, Bering Sea, 1872. H. W. Elliott.
27998. St. Paul Island, Bering Sea, August 6, 1880. Dall & Bean.
6757. Near Bering Island. H. M. Bannister.

2. **Gasterosteus microcephalus** Girard.

Tulare County, California (Cooper); San Pedro, Monterey Bay, and San Francisco, California (Jordan & Gilbert); Puget Sound (Jor. & Gilb.).

28090. Piseco Lake, Sitka, May 31, 1880. T. H. Bean.
28016. St. Paul, Kodiak (fresh-water lake), July 13, 1880. Baker & Bean.
24058 (1150). Chirikoff Island, June, 1874. W. H. Dall.
28084. Iliuliuk Lake, Unalashka, August 1, 1880. Sylvanus Bailey.

3. **Gasterosteus pungitius** L. subsp. **brachypoda**, Bean.

28017. St. Paul, Kodiak (fresh-water lake), July 13, 1880. Baker & Bean.
28076. Unga Island, Shumagins, July 18, 1880. E. P. Herendeen.
28085. Iliuliuk Lake (fresh water), Unalashka, August 1, 1880. Sylvanus Bailey.
24015. St. Paul Island, Bering Sea. H. W. Elliott.
6666. St. Michael's. H. M. Bannister.
6671. St. Michael's. H. M. Bannister.
23997. St. Michael's, 1876. L. M. Turner.
27530. Port Clarence, September 6, 1880. Dall & Bean.
27590. Elephant Point, Eschscholtz Bay, September 2, 1880. Dall & Bean.
27587. Near Icy Cape, Arctic Ocean, August 25, 1880. Dall & Bean.
23977. Alaska, 1879. Dr. Robert White.

## AULORHYNCHIDÆ.

4. **Aulorhynchus flavidus** Gill.

Monterey Bay, California (Jordan & Gilbert); San Francisco (Peters, Ayres *fide* Gill); Puget Sound (Steind., Jor. & Gilb.).

27510. Sitka, June 2, 1880. Dall & Bean.

## PLEURONECTIDÆ.

5. **Pleuronectes stellatus** Pallas.

San Luis Obispo, Monterey, and San Francisco (Jordan & Gilbert); Columbia River and Puget Sound (Jor. & Gilb.); Coppermine R. (Rich); Anderson R. (Baird); Plover Bay (Bean); De Castries Bay (Steind.).

28020 (Young). Sitka, June 8, 1880. Dall & Bean.
28012. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
27600. Chugachik Bay, Cook's Inlet, July 1, 1880. E. P. Herendeen.

27985 (Young). Chugachik Bay, Cook's Inlet, July 1, 1880. E. P. Herendeen.
27622. St. Paul, Kodiak, July 10, 1880. Dall & Bean.
27684. St. Paul, Kodiak. Wm. J. Fisher.
19708 (1070). Iliuliuk, Unalashka, September 3, 1873. W. H. Dall.
19709 (1071). Iliuliuk, Unalashka, September 3, 1873. W. H. Dall.
27640. Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.
27641. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.
21518. St. Michael's, May 30, 1877. L. M. Turner.
27693. Northern Alaska, 1880. Capt. C. L. Hooper.
27696. Northern Alaska, 1880. Capt. C. L. Hooper.

6. **Pleuronectes glacialis** Pallas.

*P. glacialis* Pall., Itin. vol. iii, p. 706—River Obi.
? *P. cicatricosus* Pall., Zoog. Ross.-Asiat. iii, 424—"mari inter Camtschatcam et Americam."

27947. Kotzebue Sound, September 2, 1880. Dall & Bean.
27700. Northern Alaska, 1880. Capt. C. L. Hooper.

7. **Pleuronectes Franklinii** Günther.

Arctic Seas of America (Günther). Perhaps identical with *P. glacialis* Pallas.

8. **Pleuronectes quadrituberculatus** Pallas.

Sea between Kamtchatka and America (Pallas).

28025. St. Paul, Kodiak, 1880. Wm. J. Fisher.

9. **Lepidopsetta bilineata** (Ayres) Gill.

Monterey Bay and San Francisco, California (Jordan & Gilbert); Puget Sound (Jor. & Gilb.).

27603. Sitka, June 3, 1880. Dall & Bean.
28021. Sitka, June 8, 1880. Dall & Bean.
27940. Sitka, June 13, 1880. Dall & Bean.
27941. Sitka. L. A. Beardslee.
28013. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
27601. Chugachik Bay, Cook's Inlet, July 1, 1880. Sylvanus Bailey.
27942. Port Chatham, Cook's Inlet, July 6, 1880. Dall & Bean.
27602. St. Paul, Kodiak, July 12, 1880. Dall & Bean.
27621. St. Paul, Kodiak, July 12, 1880. Dall & Bean.
27673. St. Paul, Kodiak, July 23, 1880. Wm. J. Fisher.
27674. St. Paul, Kodiak, July 24, 1880. Wm. J. Fisher.
27685. St. Paul, Kodiak, July 23, 1880. Wm. J. Fisher.
27686. St. Paul, Kodiak, 1880. Wm. J. Fisher.
28041. St. Paul, Kodiak, 1880. Wm. J. Fisher.
27644. Humboldt Harbor, Shumagins, July 20, 1880. E. P. Herendeen.
27943. Humboldt Harbor, Shumagins, July 19, 1880. Dall & Bean.
24018 (Young). Popoff Straits, Shumagins. W. H. Dall.
27642. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.
27639. Iliuliuk, Unalashka, July 31, 1880. Sylvanus Bailey.
27647. Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.
28003. Nateekin Bay, Unalashka, October 8, 1880. Dall & Bean.
24009 (Young). Unalashka. W. H. Dall.
24019. Unalashka. W. H. Dall.
24048. Unalashka. W. H. Dall.

Dec. 24, 1881.

24053. Unalashka. W. H. Dall.
24097 (1062). Nazan Bay, Atka, August 19, 1873. W. H. Dall.
24100 (985). Chichagoff Harbor, Attu, June 20, 1873. W. H. Dall.
24103 (1163). St. Paul Island, July 24, 1874. W. H. Dall.

10. **Limanda aspera** (Pallas) Bean.

*Pleuronectes asper* Pall., Zoog. Ross.-As., iii, 425.

Oceano orientali (Pall.); De Castries Bay (Steind. & Kner).

27944. Sitka, June 13, 1880. Dall & Bean.
27945. Sitka, June 9, 1880. Sylvanus Bailey.
?27591 (Juv.). St. Paul, Kodiak, July 10, 1880. W. H. Dall.
27678. St. Paul, Kodiak. William J. Fisher.
27631 ♀. Humboldt Harbor, Shumagins, July 19, 1880. Dall & Bean.
27632 ♀. Humboldt Harbor, Shumagins, July 19, 1880. Dall & Bean.
27527 (Juv.). Port Clarence, September 6, 1880. Dall & Bean.
27550 (Juv.). Plover Bay, Siberia, August 13, 1880. Dall & Bean.
27593 (Juv.). Indian Point, Siberia, August 15, 1880. W. H. Dall.

11. **Hippoglossoides elassodon** Jordan & Gilbert.

Puget Sound (Jor. & Gilb.).

27937. St. Paul, Kodiak, July 10, 1880. Dall & Bean.
27938. Humboldt Harbor, Shumagins, July 19, 1880. Dall & Bean.
27939. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.
23970 (Juv.). Alaska. W. H. Dall.
?24020 (Juv.). St. Michael's. W. H. Dall.

12. **Hippoglossus vulgaris** Fleming.

Sea between Kamtchatka and America (Pallas, as *Pleuronectes hippoglossus*); San Francisco and Puget Sound (Jordan & Gilbert); Sitka (Bean).

27652. Port Althorp, June 20, 1880. Dall & Bean.
27670. Port Althorp, June 20, 1880. Dall & Bean.
27707. Port Althorp, June 20, 1880. Dall & Bean.
27706. Chugachik Bay, Cook's Inlet, July 2, 1880. H. W. McDonald.
27708. Chugachik Bay, Cook's Inlet, July 1, 1880. Sylvanus Bailey.
27604. Off Marmot Island, near Kodiak, July 8, 1880. Dall & Bean.
27605. St. Paul, Kodiak, July 10, 1880. Dall & Bean.
22466 (1098). Unalashka. W. H. Dall.
22467. St. Michael's, 1876. L. M. Turner.

13. **Atheresthes stomias** Jordan & Gilbert.

San Francisco (Jor. & Gilb.).

24096 (1140) (Juv.). Port Etches, 12-18 fms., May, 1874. W. H. Dall.
27677. Off Afognak Island, 1880. William J. Fisher.
27683. Off Afognak Island, 1880. William J. Fisher.
27936. Off Popoff Island, Shumagins, July 19, 1880. T. H. Bean.

## GADIDÆ.

14. **Pollachius chalcogrammus** (Pallas) Jordan & Gilbert.

Monterey Bay, California (Jor. & Gilb.); Puget Sound (Jor. & Gilb.); Okhotsk and Kamtchatka Seas (Pallas, as *Gadus chalcogrammus*).

27989. Chugachik Bay, Cook's Inlet, July 1, 1880. Dall & Bean.
?28081 (Juv.). Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.

27637. Pirate Cove, Shumagins, July 19, 1880. W. H. Dall.
27741. Pirate Cove, Shumagins, July 19, 1880. W. H. Dall.
27742. Pirate Cove, Shumagins, July 19, 1880. E. P. Herendeen.
19710. Humboldt Harbor, Shumagins. W. H. Dall.
23972. Lat. 52° 32′(?) N., lon. 164° 20′ W., September, 1865. George Davidson.
27918 (Juv.). Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
27958 (Juv.). Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
27957 (Juv.). Chernoffsky, Unalashka, October 2, 1880. Dall & Bean.

15. **Boreogadus saida** (Lepech.) Bean.

? *Gadus pygmæus* Pallas, Zoog. Ross.-As., iii. Off Mount St. Elias.

21525. St. Michael's, February, 1877. L. M. Turner.
21526. St. Michael's, February, 1877. L. M. Turner.
24031. St. Michael's, February, 1877. L. M. Turner.
24070 (1056). Alaska. L. M. Turner.
?28096 (Juv.). Lat. 66° 45′ N., lon. 166° 35′ W., August 19, 1880. Herendeen & Bean
27570 (Juv.). Cape Lisburne, Arctic O., August 21, 1880. Dall & Bean.
27542. Plover Bay, Siberia, September 14, 1880. Dall & Bean.
27549. Plover Bay, Siberia, August 13, 1880. Dall & Bean.
27576. Plover Bay, Siberia, 1880. E. P. Herendeen.
28005. Plover Bay, Siberia, August 12, 1880. Dall & Bean.

16. **Gadus morrhua** Linnæus.

Puget Sound (Jordan & Gilbert); Cook's Inlet (Bean); between Kamtchatka and America (Pallas, Zoog., 181); De Castries Bay (Steindachner, as *G. macrocephalus*).

27654. Sitka, May 30, 1880. Dall & Bean.
27746. Old Sitka, June 10, 1880. Dall & Bean.
27606. Old Sitka, June 12, 1880. Dall & Bean.
27655. Off Marmot Island, July 8, 1880. Dall & Bean.
27656. Off Marmot Island, July 8, 1880. Dall & Bean.
27973. St. Paul, Kodiak, July 13, 1880. Dall & Bean.
24109 (924) (Juv.). Popoff Strait, July 5, 1872. Capt. W. G. Hall.
27589 (Juv.). Belkoffsky, July 23, 1880. Sylvanus Bailey.
24032. Iliuliuk, Unalashka. W. H. Dall.
24035. Unalashka. W. H. Dall.
24040 (Juv.). Iliuliuk, Unalashka. W. H. Dall.
28043 (Juv.). Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.
27956 (Juv.). Chernoffsky, Unalashka, October 2, 1880. Dall & Bean.
28007 (Juv.). Chernoffsky, Unalashka, October 1, 1880. Dall & Bean.
28072 (Juv.). Chernoffsky, Unalashka, October 2, 1880. Dall & Bean.
?24029. St. Paul Island, 9 fathoms. W. H. Dall.

17. **Microgadus proximus** (Girard) Gill.

Monterey and San Francisco, California (Jordan & Gilbert); Puget Sound (Jor. & Gilb.).

27982. Yakutat Bay, June 24, 1880. Dall & Bean.
?28059 (Juv.). Yakutat Bay, June 24, 1880. Dall & Bean.

18. **Tilesia gracilis** (Tiles.) Swainson.

*Gadus gracilis* Tiles; *G. wachna* Pallas.

27931. Port Chatham, Cook's Inlet, July 6, 1880. Dall & Bean.
27932. St. Paul, Kodiak, July, 1880. Dall & Bean.

27909. St. Paul, Kodiak, 1880. Wm. J. Fisher.
9286. St. Michael's. H. M. Bannister.
27950. Port Clarence, September, 1880. Dall & Bean.

19. **Lota maculosa** (Le S.) Rich.

9607. Nulato, Yukon River. R. Kennicott ?
10102 (647). Nulato, Yukon River. W. H. Dall.

## LYCODIDÆ.

20. **Gymnelis viridis** (Fabr.) Reinhardt.

23956. Coal Harbor, Shumagins. W. H. Dall.
23969. St. Michael's, October 10, 1876. L. M. Turner.
26623. Plover Bay, Siberia, September 14, 1880. Dall & Bean.
27538 (Juv.). Plover Bay, Siberia, September 14, 1880. Dall & Bean.
?24001. Unalashka. W. H. Dall.

21. **Lycodes Turnerii** Bean.

21529 (Type). St. Michael's, March 28, 1876. L. M. Turner.
27659 (Juv.). Plover Bay, Siberia, August 13, 1880. Dall & Bean.

22. **Lycodes coccineus** Bean.

27748 (Type). Big Diomede Island, September 10, 1880. T. H. Bean.

## STICHÆIDÆ.

23. **Stichæus punctatus** (Fabr.) Reinhardt.

26622. St. Paul, Kodiak, 1880. Wm. J. Fisher.
27581. St. Paul, Kodiak, June 10, 1880. W. H. Dall.
21718. St. Michael's, June, 29, 1874. L. M. Turner.
24012. St. Michael's. H. M. Bannister.

24. **Stichæus (?) Rothrockii** Bean.

This may represent a distinct genus—see Proc. U. S. Nat. Mus., vol. iv, p. 147.

27573 (Types). Cape Lisburne, 1880. Dall & Bean.
27565 (Types). Plover Bay, Siberia, 1880. T. H. Bean.
27580 (Types). Plover Bay, Siberia, 1880. E. P. Herendeen.

25. **Lumpenus anguillaris** (Pallas) Girard.

San Francisco to Bellingham Bay (Cooper); Bellingham Bay (Suckley); Puget Sound (Jordan & Gilbert); Kamtchatka, Aleutians, and mainland of Alaska (Pallas).

27951. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
28067. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
27988. Chugachik Bay, Cook's Inlet, July 1, 1880. Dall & Bean.
24077 (1211). Port Levasheff, Unalashka, September 18, 1874. W. H. Dall.
27525. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.
28009. Chernoffsky, Unalashka, October 1, 1880. Dall & Bean.
?27554 (Juv.). Point Belcher, Arctic Ocean, August 27, 1880. Dall & Bean.
27544. Plover Bay, Siberia, August 13, 1880. T. H. Bean.
27575. Plover Bay, Siberia, August 13, 1880. E. P. Herendeen.
26621. Plover Bay, Siberia, September 15, 1880. Dall & Bean.

## XIPHISTERIDÆ.

26. **Xiphister rupestris** Jordan & Gilbert.

Monterey Bay, California (Jor. & Gilb.); Puget Sound (Jor. & Gilb.).

7813. Vancouver Island. S. W. Hewson.
27502. Sitka. L. A. Beardslee.
27508. Sitka, May 30, 1880. Sylvanus Bailey.
24017. Alaska. W. H. Dall.

27. **Xiphister chirus** Jordan & Gilbert.

Monterey Bay and Puget Sound (Jordan & Gilbert).

23958. Adakh. W. H. Dall.
23964. Amchitka. W. H. Dall.

28. **Anoplarchus atropurpureus** (Kittlitz) Gill.

Monterey Bay, San Francisco, and Puget Sound (Jordan & Gilbert, as *A. alectrolophus*); Vancouver Island and Fraser's River (Günther, as *A. crista-galli*).

27501. Sitka. L. A. Beardslee.
27509. Sitka, June 1, 1880. T. H. Bean.
28054. Port Mulgrave, June 24, 1880. T. H. Bean.
24014. Kodiak. Jno. C. Tidball.
24064 (1146). Chagafka Cove, Kodiak, June, 1874. M. Baker.
24098 (1147). Chagafka Cove, Kodiak, June, 1874. M. Baker.
28034. St. Paul, Kodiak, 1880. Wm. J. Fisher.
28088. St. Paul, Kodiak, 1880. Wm. J. Fisher.
23948. Coal Harbor, Shumagins. W. H. Dall.
23955. Coal Harbor, Shumagins. W. H. Dall.
24005. Coal Harbor, Shumagins. W. H. Dall.
23980. Sanborn Harbor, Shumagins. W. H. Dall.
23991. Sanborn Harbor, Shumagins. W. H. Dall.
24078 (953). Sanborn Harbor, Shumagins, July, 1872. Capt. W. G. Hall.
24086. Popoff Straits, Shumagins. W. H. Dall.
27584. Iliuliuk, Unalashka, July 28, 1880. S. Bailey.
23994. Unalashka. W. H. Dall.
24084 (1187). Unalashka. W. H. Dall.
24080 (1060). Nazan Bay, Atka, August 19, 1873. W. H. Dall.
23949. Amchitka. W. H. Dall.
23963. Amchitka. W. H. Dall.
24071 (1025). Kyska Harbor, July, 1873. W. H. Dall.
24057. Port Etches. W. H. Dall.
6758. St. Michael's. H. M. Bannister.
22018. St. Michael's, October 10, 1876. L. M. Turner.
23979. St. Michael's. L. M. Turner.

29. **Muræнoides dolichogaster** (Pallas) Gill.

Kamtchatka (Pallas); De Castries Bay (Steind. & Kner); Aleutian Islands (Pallas).

30. **Murænoides ornatus** (Girard) Gill.

Puget Sound (Jordan & Gilbert).

24117. Sitka. L. A. Beardslee.
27503. Sitka. L. A. Beardslee.

27517. Sitka (Indian River), June 8, 1880. Dall & Bean.
27996. Sitka, June 2, 1880. Dall & Bean.
27532. Sitka, June 3, 1880. Dall & Bean.
24117. Sitka. W. H. Dall.
28035. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
24056. Port Etches. W. H. Dall.
27568. Chugachik Bay, Cook's Inlet, July 1, 1880. Dall & Bean.
28078. Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.
23992. Kodiak. W. G. W. Harford.
24102 (1147) (Juv.). Chagafka Cove, Kodiak, June, 1874. M. Baker.
28062. St. Paul, Kodiak, July 12, 1880. W. H. Dall.
23946. Coal Harbor, Shumagins. W. H. Dall.
24105 (928) (Juv.). Coal Harbor, Shumagins, July 3, 1872. W. G. Hall.
23981. Sanborn Harbor, Shumagins. W. H. Dall.
27585. Belkoffsky, Aliaska Peninsula, July 23, 1880. W. H. Dall.
27521. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.
27962. Iliuliuk, Unalashka. Dall & Bean.
27916. Iliuliuk, Unalashka, August 2, 1880. Dall & Bean.
28044. Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.
23993. Unalashka. W. H. Dall.
24002. Unalashka. W. H. Dall.
23975. Atka. W. H. Dall.
23957. Adakh. W. H. Dall.
23950. Amchitka. W. H. Dall.
23960. Amchitka. W. H. Dall.
24173. Attu, June 23, 1879. Dr. Robert White.
24006. Port Moller. W. H. Dall.

31. **Muræenoides maxillaris** Bean.

23999. (Type) St. Paul Island, 1872. H. W. Elliott.

## ANARRHICHADIDÆ.

32. **Anarrhichas lepturus** Bean.

21509 (Type). St. Michael's, 1877. L. M. Turner.
21510 (Type). St. Michael's, June 24, 1876. L. M. Turner.
(——) Collection of Alaska Commercial Company, San Francisco.

## TRACHINIDÆ.

33. **Bathymaster signatus** Cope.

Washington Territory (Bean); Puget Sound (Jordan & Gilbert).

24036. Sitka, October 5, 1861. W. G. W. Harford.
27924. Sitka, June 7, 1880. T. H. Bean.
27925. Sitka, 1880. L. A. Beardslee.
27970. St. Paul, Kodiak, 1880. Wm. J. Fisher.
23954. Coal Harbor, Shumagins. W. H. Dall.
24004. Coal Harbor, Shumagins. W. H. Dall.
27646. Off Popoff Island., Shumagins, July 19, 1880. E. P. Herendeen.
27645. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.
23976. Unalashka. W. H. Dall.
24003. Unalashka. W. H. Dall.
24016. Unalashka. W. H. Dall.
24092. Unalashka. W. H. Dall.

## TRICHODONTIDÆ.

34. **Trichodon Stelleri** C. & V.

23947. Coal Harbor, Shumagins. W. H. Dall.
27980. Humboldt Harbor, Unga Island, Shumagins, July 21, 1880. Marcus Baker.
23933. Unalashka. W. H. Dall.
24054. Unalashka. W. H. Dall.
24033 (1184). Unalashka, September 1, 1874. W. H. Dall.
24050 (1168). Cape Etolin, Nunivak Island, July, 1874. W. H. Dall.

## CYCLOPTERIDÆ.

35. **Eumicrotremus spinosus** (Fabr.) Gill.

*Cyclopterus orbis* Günther (Esquimault Harbor).

27505. Iliuliuk, Unalashka (from stomach of *Alepidosaurus ferox*), October, 1880. T. H. Bean.
27506. Iliuliuk, Unalashka (from stomach of *Alepidosaurus ferox*), October, 1880. T. H. Bean.
27507. Iliuliuk, Unalashka (from stomach of *Alepidosaurus ferox*), October, 1880. T. H. Bean.
——. St. Paul Island, August, 1868. W. H. Dall.
27548. Plover Bay, Siberia, August 13, 1880. Dall & Bean.

## LIPARIDIDÆ.

36. **Liparis pulchellus** Ayres.

Monterey and San Francisco, California (Jordan & Gilbert).

?28091. St. Paul, Kodiak, 1880. Wm. J. Fisher.
27917. Iliuliuk, Unalashka, August 2, 1880. Dall & Bean.

37. **Liparis calliodon** (Pallas) Günther.

Kamtchatka and Aleutian Islands (Pallas).

?24063 (1137). Port Etches, May, 1874. W. H. Dall.
27586. Belkoffsky, Aliaska Peninsula, July 23, 1880. W. H. Dall.
23990. Sanborn Harbor, Shumagins. W. H. Dall.
?28037 (Juv.). Nateekin Bay, Unalashka, October 8, 1880. Dall & Bean.
?23966. Adakh. W. H. Dall.
24091 (1055). Bay of Islands, Adakh, August, 1873. W. H. Dall.
?23951. Amchitka. W. H. Dall.
?23962. Amchitka. W. H. Dall.
?24065 (1039). Amchitka, July, 1873. W. H. Dall.
?23978. St. Michael's. L. M. Turner.
27546. Plover Bay, Siberia, August 13, 1880. Dall & Bean.
27536. Plover Bay, Siberia, September 14, 1880. Dall & Bean.

38. **Liparis cyclopus** Günther.

Esquimault Harbor (Günth.).

24046. Unalashka. W. H. Dall.
24047. Port Moller. W. H. Dall.

39. **Liparis gibbus** Bean.

24010. Captain's Bay, Unalashka. W. H. Dall.
24047 (Type). St. Paul Island, 1872. H. W. Elliott.
27545 (Type). Plover Bay, Siberia, August 13, 1880. Dall & Bean.
27535 (Type). Plover Bay, Siberia, September 14, 1880. Dall & Bean.
26625(Type(. Off Cape Tchaplin, Siberia, August 15, 1880. Dall & Bean.

## AGONIDÆ.

40. **Siphagonus barbatus** Steindachner.

Hakodadi and Nagasaki, Japan (Steind.); "Eismeer, zunächst der Behringsstrasse" (Steind.).

28052. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
14932. Unalashka. W. H. Dall.
27529. Port Clarence, September 6, 1880. Dall & Bean.

41. **Podotheous acipenserinus** (Pallas) Gill.

Puget Sound (Jordan & Gilbert); Vancouver Island, Gulf of Georgia (Günther); Unalashka (Pallas).

17125. Port Townsend, Washington Territory, April 6, 1877. J. G. Swan.
7310. Vancouver Island. A. W. Hewson.
?27583 (Juv.). St. Paul, Kodiak. W. H. Dall.
24011 (Juv.). Unalashka. W. H. Dall.
?27574 (Juv.). Cape Lisburne, Artic O., August 21, 1880 (no barbels). Dall & Bean.
10134. Alaska.

42. **Podothecus trispinosus** (Lockington) Jordan & Gilbert.

Santa Barbara and San Francisco, California (Jor. & Gilb.).

24060. Sitka. W. H. Dall.

## COTTIDÆ.

43. **Cottus tæniopterus** Kner.

Wien. Sitzb. lviii; 1 Abth., 310, taf. 4, fig. 10.

?24062 (Juv.). Hagmeister. W. H. Dall.
21522. St. Michael's. L. M. Turner.
21523. St. Michael's. L. M. Turner.
28004. Point Belcher, Arctic O., August 27, 1880. Dall & Bean.
?27559 (Juv.). Head of Plover Bay, Siberia, August 12, 1880. T. H. Bean.

44. **Cottus polyacanthocephalus** Pallas.

Puget Sound (Jordan & Gilbert); Off Mount St. Elias (Pallas).

27661. Sitka. L. A. Beardslee.
27512 (Juv.). Sitka, June 2, 1880. Dall & Bean.
27607. Sitka, June 6, 1880. Dall & Bean.
27665. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
27997. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
28039. Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.
27625. St. Paul, Kodiak, July 11, 1880 (head). B. G. McIntyre.
28063. St. Paul, Kodiak, July 12, 1880. W. H. Dall.
27986. St. Paul, Kodiak, July 24, 1880. Wm. J. Fisher.
29033. St. Paul, Kodiak. Wm. J. Fisher.
27623. Humboldt Harbor, Shumagins, July 19, 1880. Dall & Bean.
27624. Pirate Cove, Popoff Island, Shumagins, July 19, 1880. Dall & Bean.
28031. Popoff Island, Shumagins, July 20, 1880. Dall & Bean.
19698 (1078). Iliuliuk, Unalashka, September 3, 1873. W. H. Dall.
19699 (1079). Iliuliuk, Unalashka, September 3, 1873. W. H. Dall.
27520. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.
27643. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.

27964. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
27638. Iliuliuk, Unalashka, October 15, 1880. Dall & Bean.
27671. Iliuliuk, Unalashka, October 15, 1880. Dall & Bean.
27946. Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.
23499. Unalashka. W. H. Dall.
24075 (1215) (Juv.). Unalashka, 60 fms., September 18, 1874. W. H. Dall.
28008. Chernoffsky, Unalashka, October 1, 1880. Dall & Bean.
27955. Chernoffsky, Unalashka, October 1, 1880. Dall & Bean.
24099 (1062). Nazan Bay, Atka, August 19, 1873. W. H. Dall.
23965. Amchitka. W. H. Dall.
?23935 (Juv.). Port Moller. W. H. Dall.
?27571 (Juv.). Cape Lisburne, Arctic O., August 21, 1880. Dall & Bean.
?27543 (Juv.). Plover Bay, Siberia, September 14, 1880. Dall & Bean.
23944. (Juv.) Alaska. W. H. Dall.

45. **Cottus niger** Bean.

23937. Sanborn Harbor, Shumagins. W. H. Dall.
23928. St. Paul Island, 1872. H. W. Elliott.
23929. St. Paul Island, 1872. H. W. Elliott.
27952 (Types). St. Paul Island, August 6, 1880. John Armstrong.
27971 (Types). St. Paul Island, August 6, 1880. John Armstrong.

46. **Cottus humilis** Bean.

21519. St. Michael's, 1877. L. M. Turner.
21520. St. Michael's, 1877. L. M. Turner.
21521. St. Michael's, June 11, 1875. L. M. Turner.
27972 (Type). Chamisso Island, Eschscholtz Bay, August 31, 1880. Dall & Bean.
27553 (Juv.). Point Belcher, Arctic Ocean, August 27, 1880. Dall & Bean.
?24013 (Juv.). Alaska.

47. **Aspidocottus bison** Girard.

San Francisco and Puget Sound (Jordan & Gilbert).

27983. Sitka. L. A. Beardslee.
29038 (Juv.). St. Paul, Kodiak. Wm. J. Fisher.

48. **Ceratocottus diceraus** (Pallas) Gill.

23932 (1108). Sitka, 15 fms. gn. md., May, 1874. W. H. Dall.

49. **Uranidea microstoma** Lockington.

27516. Indian River, Sitka, June 8, 1880. Dall & Bean.
27534. Indian River, Sitka, June 11, 1880. Sylvanus Bailey.
?23927. Sitka. W. H. Dall.
26922 (Type). Kodiak. W. N. Lockington.
28071. St. Paul, Kodiak, 1880. Wm. J. Fisher.
27596. Aleutian Islands. A. Greenebaum.
28083. Iliuliuk, Unalashka, August 1, 1880. Sylvanus Bailey.

50. **Gymnacanthus pistilliger** (Pallas) Gill.

Kamtchatka and Unalashka (Pallas).

24089 (1014 & 1015). Kyska Harbor, July 7, 1873. W. H. Dall.
?27592 (Juv.). Point Belcher, Arctic Ocean, August 27, 1880. Dall & Bean.
27560 (Juv.). Plover Bay, Siberia, August 12, 1880. T. H. Bean.
26626. Off Cape Tchaplin, Siberia, August 15, 1880. W. H. Dall.

51. **Gymnacanthus galeatus** Bean.

28097 (Types). Iliuliuk, Unalashka, July 30, 1880. Dall & Bean.
?27595 (Juv.). Off Cape Sabine, Arctic Ocean, August 24, 1880. Dall & Bean.

52. **Artedius notospilotus** Girard.

Santa Barbara, San Luis Obispo, and San Francisco, California (Jor. & Gilb.); Puget Sound (Jor. & Gilb.).

23936. Sanborn Harbor, Shumagins. W. H. Dall.
23934. Unalashka. W. H. Dall.
23938. Unalashka. W. H. Dall.

53. **Hemilepidotus trachurus** (Pallas) Günther.

San Francisco and Puget Sound (Jordan & Gilbert, as *H. Gibbsii*).

27609. Sitka, May 28, 1880. Dall & Bean.
27610. Sitka, May 29, 1880. Dall & Bean.
27750. Sitka, June 2, 1880. Dall & Bean.
27511 (Juv.). Sitka, June 2, 1880. Dall & Bean.
27901. Sitka, 1880. L. A. Beardslee.
27664. Port Althorp, June 20, 1880. Dall & Bean.
24104 (1140) (Juv.). Port Etches, 12 to 18 fms., May, 1874. W. H. Dall.
27608. Port Chatham, Cook's Inlet, July 5, 1880. Dall & Bean.
?24094 (Juv.). Popoff Strait. W. H. Dall.
24107 (925) (Juv.). Popoff Strait, Shumagins, July 3, 1872. W. H. Dall.
?24066 (931) (Juv.). Coal Harbor, Shumagins, July, 1872. W. G. Hall.
?24090 (934) (Juv.). Coal Harbor, Shumagins, July, 1872. W. G. Hall.
23939 (Juv.). Unalashka. W. H. Dall.
23940 (1185) (Juv.). Unalashka, 9 to 16 fms., September 1, 1874. W. H. Dall.
24108 (1013) (Juv.). Kyska, July 7, 1873. W. H. Dall.
24101 (1014) (Juv.). Kyska. W. H. Dall.
?24079 (1019) (Juv.). Kyska, July 7, 1873. W. H. Dall.
?24072 (1026) (Juv.). Kyska, July, 1873. W. H. Dall.
24095 (1036) (Juv.). Kyska, 10 fms. in Pass, July, 1873. W. H. Dall.
?24076 (1062) (Juv.). Nazan Bay, Atka, Aug. 19, 1873. W. H. Dall.
?24059 (1054) (Juv.). Bay of Islands, Adakh, August, 1873. W. H. Dall.
?24085 (1040) (Juv.). Amchitka, July 26, 1873.
?24082 (985) (Juv.). Chichagoff Harbor, Attu, June 20, 1873. W. H. Dall.

54. **Hemilepidotus Jordani** Bean.

*Cottus trachurus* Pallas (part), referred to in the following sentence: "*In majori specimine color supra fuscus, subtus pallido-albus, immaculatus.*"

27658. Port Althorp, June 20, 1880. Dall & Bean.
27659. Port Chatham, Cook's Inlet, July 6, 1880. Dall & Bean.
27660. Port Chatham, Cook's Inlet, July 6, 1880. Dall & Bean.
27611. St. Paul, Kodiak, July 12, 1880. Dall & Bean.
29036. St. Paul, Kodiak. Wm. J. Fisher.
27612. Humboldt Harbor, Shumagins, July 17, 1880. Dall & Bean.
27613. Humboldt Harbor, Shumagins, July 17, 1880. Dall & Bean.
27614. Humboldt Harbor, Shumagins, July 17, 1880. Dall & Bean.
27615. Humboldt Harbor, Shumagins, July 17, 1880. Dall & Bean.
27634. Humboldt Harbor, Shumagins, July 19, 1880. Dall & Bean.
27598 (Type). Iliuliuk, Unalashka, July 30, 1880. Sylvanus Bailey.
28033 (Juv.). Iliuliuk, Unalashka, October 12, 1880. Dall & Bean.
27633. Iliuliuk, Unalashka, October 15, 1880. Dall & Bean.
23943. Iliuliuk, Unalashka. W. H. Dall.
27749. Chernoffsky, Unalashka, October 1, 1880. Dall & Bean.
27539 (Juv.). Plover Bay, Siberia, September 14, 1880. Dall & Bean.

55. **Melletes papilio** Bean.

23751 (Type). St. Paul Island, 1872. H. W. Elliott.

56. **Leptocottus armatus** Girard.

San Diego, San Pedro, Santa Barbara, San Luis Obispo, Monterey Bay, and San Francisco, California (Jordan & Gilbert); Puget Sound (Jor. & Gilb.).

6754. Sitka. F. Bischoff.
23931. Sitka (very bad state). C. S. Bulkley.
27968. Sitka, May 31 to June 8, 1880. Dall & Bean.
27976. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
29037. St. Paul, Kodiak. Wm. J. Fisher.

57. **Oligocottus maculosus** Girard.

San Luis Obispo, Monterey Bay, and San Francisco, California (Jor. & Gilb.); Puget Sound (Jor. & Gilb.).

7815. Vancouver Island. A. W. Hewson.
15029. Victoria. Dall & Brown.
6755. Sitka. F. Bischoff.
7322. Sitka, August 18. W. H. Dall.
27504. Sitka. L. A. Beardslee.
27514. Sitka, June 3, 1880. Dall & Bean.
27531. Sitka, June 3, 1880. Dall & Bean.
27515. Sitka (Indian River), June 8, 1880. Dall & Bean.
28093. Alexandrovsk, Cook's Inlet, July 4, 1880. Dall & Bean.

58. **Oligocottus globiceps** Girard.

Monterey Bay and San Francisco, California (Jor. & Gilb.); Puget Sound (Jor. & Gilb.).

6751. Sitka. F. Bischoff.
24083 (1147). Chagafka Cove, Kodiak, June, 1874. M. Baker.
23959. Adakh. W. H. Dall.
23952. Amchitka. W. H. Dall.

59. **Triglops pingelii** Reinhardt.

Off Point Bingham, Jacobi Island, Gulf of Alaska (Bean).

27541. Plover Bay, Siberia, September 14, 1880. Dall & Bean.

60. **Blepsias cirrhosus** (Pallas) Günther.

San Francisco and Puget Sound (Jordan & Gilbert).

24114. Sitka. L. A. Beardslee.
28051. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
24039. Iliuliuk, Unalashka. W. H. Dall.
27522. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.
27919. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
27960. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
28073. Chernoffsky, Unalashka, October 2, 1880. Dall & Bean.
24106 (1055) (Juv.). Bay of Islands, Adakh, August, 1873. W. H. Dall.
24088 (1003) (Juv.). Kyska, June 28, 1873. W. H. Dall.
24087 (1035) (Juv.). Kyska, 10 fms. in Pass, July 15, 1873. W. H. Dall.
24030 (Juv.). St. Paul Island, 9 fathoms. W. H. Dall.

61. **Blepsias bilobus** Cuv. & Val.

Kamtchatka (Günther).

28061. St. Paul, Kodiak, 1880. Wm. J. Fisher.

62. **Nautichthys oculofasciatus** Girard.

San Francisco and Puget Sound (Jordan & Gilbert).

23941 (1185) (Juv.). Unalashka, Sept. 1, 1874. W. H. Dall.
24073 (1054) (Juv.). Bay of Islands, Adakh, August, 1873. W. H. Dall.
24067 (Juv.). Kyska. W. H. Dall.
27582 (Juv.). St. Paul, Kodiak, July 10, 1880. W. H. Dall.
28066 (Juv.). St. Paul, Kodiak, July 12, 1880. W. H. Dall.

63. **Rhamphocottus Richardsoni** Günther.

California (Lockington); Fort Rupert, North America (Günther).

26620. St. Paul, Kodiak, 1880. Wm. J. Fisher.

## HEMITRIPTERIDÆ.

64. **Hemitripterus americanus** (Gmel.) Storer.

*H. cavifrons* Lockington, Kodiak.

I have compared Lockington's type with *H. americanus* in the museum of the California Academy of Sciences.

## SCORPÆNIDÆ.

65. **Sebastichthys maliger** Jordan & Gilbert.

Monterey Bay and San Francisco, California (Jor. & Gilb.); Puget Sound (Jor. & Gilb.).

27713. Sitka, June 2, 1880. Dall & Bean.
?27922 (Juv.). Sitka, June 9, 1880. Corbin Ball.

66. **Sebastichthys caurinus** (Rich.) Jor. & Gilb.

Puget Sound (Jor. & Gilb.).

27714. Old Sitka, June 10, 1880. T. H. Bean.

67. **Sebastichthys ruber** (Ayres) Lockington.

Santa Barbara, Monterey Bay, and San Francisco, California (Jor. & Gilb.); Puget Sound (Jor. & Gilb.); off Point Bingham, Jacobi Island, Gulf of Alaska (Bean).

68. **Sebastichthys melanops** (Girard) Jor. & Gilb.

Monterey Bay and San Francisco (Jor. & Gilb.); Puget Sound (Jor. & Gilb.).

27628. Sitka, May 28, 1880. Dall & Bean.
27921. Sitka, May 28, 1880. A. T. Whitford.
27747. Sitka. L. A. Beardslee.
27675. St. Paul, Kodiak, 1880. Wm. J. Fisher.

69. **Sebastichthys ciliatus** (Tiles.).

Aleutians (Pallas, as *Perca variabilis*).

27255. Kodiak. D. S. Jordan.

## CHIRIDÆ.

70. **Hexagrammus asper** Steller.

Kamtchatka (Pallas, as *Labrax hexagrammus*).

23930. Sitka. C. S. Bulkley.
27910. Sitka, May 31, 1880. Dall & Bean.
27911. Old Sitka, June 12, 1880. Dall & Bean.
27912. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
28060. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
28079 (Juv.). Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.
?27974 (Juv.). St. Paul, Kodiak, July 13, 1880. Dall & Bean.
27650. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
27961. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
28045. Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.
23982. Unalashka. W. H. Dall.
23985. Unalashka. W. H. Dall.
23986. Unalashka. W. H. Dall.
23974. Atka. W. H. Dall.
21530. St. Michael's, June, 1875. L. M. Turner.
21531. St. Michael's, June, 1875. L. M. Turner.
21532. St. Michael's, June, 1875. L. M. Turner.
21533. St. Michael's, February, 1877. L. M. Turner.
27528 (Juv.). Port Clarence, September 6, 1880. Dall & Bean.

71. **Hexagrammus ordinatus** (Cope) Bean.

27987. Old Sitka, June 2, 1880. Dall & Bean.
28027. Popoff Island, Shumagins, July 20, 1880. Dall & Bean.
27523. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.
27648. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.
27649. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
27967. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
27975. Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.
27935. Chernoffsky, Unalashka, October 2, 1880. Dall & Bean.
24042. Unalashka. W. H. Dall.
24043. Unalashka. W. H. Dall.

72. **Hexagrammus superciliosus** (Pallas) Jor. & Gilb.

Monterey Bay and San Francisco (Jor. & Gilb.); Puget Sound (Jor. & Gilb.); Unalashka (Pallas).

5606. Sitka. F. Bischoff.
27666. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
27913. St. Paul, Kodiak, July 10, 1880. Dall & Bean.
29034. St. Paul, Kodiak. Wm. J. Fisher.
24051. Kodiak. F. Bischoff.
27934. Chernoffsky, Unalashka, October 2, 1880. Dall & Bean.
24172 (Skin). Attu, 1879. Dr. Robert White.

73. **Hexagrammus scaber** Bean.

23961 (Juv.) (Type). Amchitka. W. H. Dall.
27920 (Juv.) (Type). Iliuliuk, Unalashka, July 31, 1880. T. H. Bean.

74. **Hexagrammus decagrammus** (Pallas) Jor. & Gilb.

San Luis Obispo, Monterey Bay, and San Francisco (Jor. & Gilb.); Puget Sound (Jor. & Gilb.); off Mount St. Elias, Gulf of Alaska (Pallas).

27627. Sitka, June 3, 1880. Dall & Bean.
27709 ♀. Old Sitka, June 10, 1880. Dall & Bean.
27626. Old Sitka, June 12, 1880. Dall & Bean.
27710 ♂. Old Sitka. L. A. Beardslee.
27711 ♀. Old Sitka. L. A. Beardslee.
27653. Chatham Strait, June 20, 1880. Marcus Baker.
24022. Unalashka. W. H. Dall.

75. **Pleurogrammus monopterygius** (Pallas) Gill.

Unalashka (Pallas, as *Labrax monopterygius*).

27112. Kodiak. D. S. Jordan.
29035. St. Paul, Kodiak. Wm. J. Fisher.
27930. Iliuliuk, Unalashka, October 7, 1880. Robert King.
27933. Chernoffsky, Unalashka, October 2, 1880. Dall & Bean.
27954. Chernoffsky, Unalashka, October 2, 1880. Dall & Bean.
24174 (Skin). Attu, June 23, 1879. Dr. Robert White.

76. **Ophiodon elongatus** Girard.

Santa Barbara, San Luis Obispo, Monterey Bay, San Francisco (Jor. & Gilb.); Puget Sound (Jor. & Gilb.).

27657. Sitka, June 7, 1880. Dall & Bean.

77. **Anoplopoma fimbria** (Pallas) Gill.

Monterey Bay, San Francisco, and Puget Sound (Jordan & Gilbert); off Mount St. Elias, Alaska (Pallas, as *Gadus fimbria*).

27745. Sitka. L. A. Beardslee.

## AMMODYTIDÆ.

78. **Ammodytes americanus** De Kay.

*A. personatus* Girard.

Monterey Bay and Puget Sound (Jordan & Gilbert).

24055 (1105). Sitka, May, 1874. W. H. Dall.
24113. Sitka. L. A. Beardslee.
28040. Sitka, May 31, 1880. Dall & Bean.
28055. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
27993. Chugachik Bay, Cook's Inlet, July 1, 1880. Dall & Bean.
28070. Port Chatham, Cook's Inlet, July 6, 1880. Dall & Bean.
24110 (1152). Semidi Islands, 12 to 28 fms., June, 1874. W. H. Dall.
28011. Humboldt Bay, Shumagins, July 21, 1880. H. W. McDonald.
24093 (1210). Unalashka, 20 fms., September 18, 1874. W. H. Dall.
24028. Iliuliuk, Unalashka, June 4. W. H. Dall.
27963. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
24008. Captain's Bay, Unalashka. W. H. Dall.
28006. Chernoffsky, Unalashka, October 1, 1880. Dall & Bean.
24034. Unalashka. W. H. Dall.
24081 (1038). Constantine Bay, Amchitka, July 24, 1873. W. H. Dall.
27526. Port Clarence, September 6, 1880. Dall & Bean.
28014. Port Clarence, September 6, 1880. Dall & Bean.

28024. Port Clarence, September 6, 1880. Dall & Bean.
27556 (Juv.). Point Belcher, Arctic Ocean, August 27, 1880. Dall & Bean.
27562. Plover Bay, Siberia, August 12, 1880. T. H. Bean.
27577. Plover Bay, Siberia, August 13, 1880. E. P. Herendeen.

79. **Ammodytes alascanus** Cope.

?6667. Sitka. F. Bischoff.
24115. Sitka (180 skin-folds). L. A. Beardslee.

## PSYCHROLUTIDÆ.

80. **Psychrolutes paradoxus** Günther.

Vancouver Island (Günther); Kodiak Island (collection of Alaska Commercial Company, of San Francisco).

## ESOCIDÆ.

81. **Esox lucius** Linn.

Yukon River (Dall).

6886. Fort Simpson, British America.
7552. Fort Resolution. R. Kennicott.
8827. Fort Rae. R. Kennicott.
8158. Slave Lake. R. Kennicott.

## UMBRIDÆ.

82. **Dallia pectoralis** Bean.

6661 (Types). St. Michael's. H. M. Bannister.
23498 (Types). St. Michael's, February, 1877. L. M. Turner.

## MICROSTOMIDÆ.

83. **Osmerus dentex** Steindachner.

De Castries Bay, Siberia (Steind.).

?28058 (Juv.). Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
21527. St. Michael's, February, 1877. L. M. Turner.
21528. St. Michael's, February, 1877. L. M. Turner.
27914. Port Clarence, September 8, 1880. Dall & Bean.
27981. Port Clarence (dried), September 6, 1880. Dall & Bean.

84. **Osmerus spirinchus** (Pallas)?

? *O. dentex* Steind.

27558. Kotzebue Sound, September 2, 1880. E. P. Herendeen.

85. **Mallotus villosus** (Müller) Cuv.

Kamtchatka and islands between Asia and America (Pallas).

24118. Sitka. L. A. Beardslee.
28022. Sitka, September, 1879. L. A. Beardslee.
27990. Chugachik Bay, Cook's Inlet, July 1, 1880. T. H. Bean.
28080. Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.
28038. Off Marmot Island (cod stomach), July 8, 1880. T. H. Bean.
6664. St. Michael's. H. M. Bannister.
24038. Bering Strait. Wm. Stimpson.
27572 (Juv.). Cape Lisburne, Arctic O., August 21, 1880. Dall & Bean.
27555 (Juv.). Point Belcher, Arctic O., August 27, 1880. Dall & Bean.
27563 (Juv.). Plover Bay, Siberia, August 12, 1880. T. H. Bean.
27564 (Juv.). Plover Bay, Siberia, August 12, 1880. T. H. Bean.
27579 (Juv.). Plover Bay, Siberia, August 13, 1880. E. P. Herendeen.

86. **Hypomesus olidus** (Pallas) Gill.

De Castries Bay (Kner, as *Osmerus oligodon*); streams and lakes of Kamtchatka (Pallas, as *Salmo olidus*).

23973. St. Michael's, May 20, 1877. L. M. Turner.
24044. St. Michael's. L. M. Turner.

87. **Hypomesus pretiosus** (Girard) Gill.

San Francisco and Puget Sound (Jordan & Gilbert, as *H. olidus*.)

27995. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.

88. **Thaleichthys pacificus** (Rich.) Girard.

Columbia River and Puget Sound (Jordan & Gilbert); Vancouver Island (Günther).

24170. Stickene River, July, 1879. Dr. Robert White.
24111. Wrangell, 1880. R. D. Crittenden.
24112. Southern Alaska. L. A. Beardslee.
24116. Sitka. L. A. Beardslee.
24661. Sitka (dried). W. H. Dall.
28001. Chilkat River, June, 1880. Marcus Baker.
24122. Katmai, Aliaska, 1880. B. G. McIntyre.

## COREGONIDÆ.

89. **Coregonus laurettæ** Bean.

9606. Nulato, Yukon River. R. Kennicott.
24023. Nulato, Yukon River. W. H. Dall.
24024. Nulato, Yukon River. W. H. Dall.
27915 (Type). Port Clarence, September 8, 1880. T. H. Bean.
27695 (Types). Point Barrow, 1880. Capt. C. L. Hooper.

90. **Coregonus Merckii** Günther, variety.

Kolima and other Siberian rivers (Pallas, as *Salmo clupeoides*, *fide* Günther).

23995. St. Michael's, February, 1877. L. M. Turner.
27698. Northern Alaska, 1880. Capt. C. L. Hooper.

91. **Coregonus clupeiformis** (Mitchill) Milner.

Great Lake Region to Polar Sea (Jordan).

?7274. Fort Rae, Slave Lake.
9521. St. Michael's. H. M. Bannister.
?23996 (Juv.). St. Michael's. L. M. Turner.
27790. Nulato, Yukon River. W. H. Dall.
27791. Nulato, Yukon River. J. T. Dyer.
24026. Yukon River. W. H. Dall.

92. **Coregonus Kennicottii** Milner.

8971 (Type). Fort Good Hope, British America. R. Kennicott.
9605. Nulato, Yukon River. R. Kennicott.
24025. Nulato, Yukon River, March 27, 1867. W. H. Dall.

93. **Coregonus quadrilateralis** Rich.

Arctic Ocean and rivers of Arctic North America (Günther).

27793. Slave Lake. R. Kennicott.
27792. Nulato, Yukon River, April 21, 1867. W. H. Dall.
24000 (Juv.). Fort Yukon, 1877. L. M. Turner.

94. **Thymallus signifer** (Rich.) Cuv. & Val.

Lakes and rivers north of Mackenzie River (Rich.).

9523. St. Michael's. H. M. Bannister.
7993. Nulato, Yukon River. W. H. Dall.

## SALMONIDÆ.

95. **Salvelinus malma** (Walb.) Jordan & Gilbert.

? *Salmo curilus* Pallas.

McCloud River, California (Bean); Columbia River and Puget Sound (Jordan & Gilbert).

27731. Sitka, May, 1880. A. T. Whitford.
27734. Sitka, May 31, 1880. L. A. Beardslee.
27739. Sitka. L. A. Beardslee.
27908. Sitka. L. A. Beardslee.
24120. Sitka. L. A. Beardslee.
27730. Silka (Indian River), July to August, 1879. L. A. Beardslee.
27733. Sitka, May 31, 1880. Dall & Bean.
27735. Sitka, May 31, 1880. Dall & Bean.
27513. Sitka (Pyloric cæca), June 2, 1880. T. H. Bean.
27518 (Juv.). Sitka (Indian River), June 8, 1880. Dall & Bean.
27620. Sitka, June 8, 1880. Dall & Bean.
27599. Old Sitka, June 2, 1880. Dall & Bean.
27732. Old Sitka, June 2, 1880. Dall & Bean.
27729. Port Althorp, June 18–19, 1880. Dall & Bean.
27992. Chugachik Bay, Cook's Inlet, July 1, 1880. T. H. Bean.
27728. Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.
27740. Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.
27969. St. Paul, Kodiak, 1880. Wm. J. Fisher.
27727. St. Paul, Kodiak, July 10, 1880. Dall & Bean.
28029. Humboldt Harbor, Shumagins, July 20, 1880. W. H. Dall.
28095 (Juv.). Little Koniushi Island, Shumagins, July 16, 1880. W. H. Dall.
23984. Unalashka. W. H. Dall.
19702 (1080). Unalashka. W. H. Dall.
27726. Ilinliuk, Unalashka, July 28, 1880. Dall & Bean.
27966 (Juv.). Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
27597. Illiuliuk, Unalashka, July, 1880. Dall & Bean.
28002. Nateekin Bay, Unalashka, October 8, 1880. Dall & Bean.
23967. Kyska Harbor. W. H. Dall.
21511. St. Michael's, February, 1877. L. M. Turner.
21512. St. Michael's, February, 1877. L. M. Turner.
21514. St. Michael's, February, 1877. L. M. Turner.
21517. St. Michael's, March, 1876. L. M. Turner.
21513. Unalaklik River, March, 1876. L. M. Turner.
21515. Unalaklik River, March, 1876. L. M. Turner.
21516. Unalaklik River, March, 1876. L. M. Turner.
27724. Port Clarence, September 8, 1880. Dall & Bean.

27691 (Skin). Northern Alaska, 1880. Capt. C. L. Hooper.
27692 (Head). Northern Alaska, 1880. Capt. C. L. Hooper.
27701 (Skin). Northern Alaska, 1880. Capt. C. L. Hooper.
27569 (Juv.). Cape Lisburne, Arctic Ocean, August 21, 1880. Dall & Bean.
19707 (966). Alaska. W. H. Dall.
27725. Plover Bay, Siberia, August 12–13, 1880. Dall & Bean.
28046 (Cæca). Plover Bay, Siberia, August 13, 1880. T. H. Bean.

96. **Salmo purpuratus** Pallas.

Monterey Bay, San Francisco, Columbia River, and Puget Sound (Jordan & Gilbert); rivers Bolschaya and Bystraya, Kamtchatka (Pallas).

24119. Sitka. L. A. Beardslee.
27902. Sitka, May 29, 1880. L. A. Beardslee.
?27905. Sitka, July or August, 1879. L. A. Beardslee.
27906. Sitka, July or August, 1879. L. A. Beardslee.
27907. Sitka. L. A. Beardslee.
27904. Sitka, May, 1880. A. T. Whitford.
27903. Sitka, June 1–3, 1880. W. M. Noyes.
24123. St. Paul, Kodiak, 1880. W. G. W. Harford.
27690. Northern Alaska, 1880. Capt. C. L. Hooper.
27699. Northern Alaska, 1880. Capt. C. L. Hooper.

97. **Salmo Gairdneri** Rich.

Monterey Bay, San Francisco, Columbia River, and Puget Sound (Jordan & Gilbert).

27662 ♀. Sitka, June 9, 1880. T. H. Bean.
27738 ♀ (Skin). Sitka, June 10, 1880. T. H. Bean.
24125 (Eggs). Sitka, June 10, 1880. T. H. Bean.
27533 ♀ (Pyloric cæca). Sitka, June 10, 1880. T. H. Bean.
24124 (Juv.). St. Paul, Kodiak, 1880. W. G. W. Harford.

98. **Salmo irideus** Gibbons.

I have doubtfully referred to this species the following young specimen:

28023. Sitka, July or August, 1879. L. A. Beardslee.

99. **Oncorhynchus chouicha** (Walb.) Jor. & Gilb.

Monterey Bay, San Francisco, Columbia River, and Puget Sound (Jordan & Gilbert).

27676 (Skin). Kassilov River, Cook's Inlet, 1880. William J. Fisher.
27680 (Skin). Kassilov River, Cook's Inlet, 1880. William J. Fisher.
27679 (Skin). Alaska, 1880. William J. Fisher.
27681 (Skin). Alaska, 1880. William J. Fisher.
27682 (Spermaries). Alaska, 1880. William J. Fisher.
27716 (Belly). Yukon River. Steward of steamer St. Paul.

100. **Oncorhynchus keta** (Walb.) Gill & Jordan.

San Francisco, Columbia River, and Puget Sound (Jordan & Gilbert).

27737 ♀ (Skin). Old Sitka, June 12, 1880. T. H. Bean.
27617 ♂ (Skin). Alexandrovsk, Cook's Inlet, July 4, 1880. J. Cohen.
28050 (Cæca and spermaries). Alexandrovsk, Cook's Inlet, July 4, 1880. J. Cohen.
27618 (Head). St. Paul, Kodiak, July 13, 1880. Dall & Bean.

27619 (Skin). St. Paul, Kodiak, July 11, 1880. Dall & Bean.
28010 (Eggs). St. Paul, Kodiak, July 13, 1880. Dall & Bean.
27221. Bering Strait, 1880. D. S. Jordan.
27687 (Skin). "Northern Alaska," 1880. Capt. C. L. Hooper.
27688 (Skin). "Northern Alaska," 1880. Capt. C. L. Hooper.
27689 ♂ (Skin). "Northern Alaska," 1880. Capt. C. L. Hooper.
27702 (Skin). "Northern Alaska," 1880. Capt. C. L. Hooper.
27703 (Skin). "Northern Alaska," 1880. Capt. C. L. Hooper.
27704 (Skin). "Northern Alaska," 1880. Capt. C. L. Hooper.

**101. Oncorhynchus nerka** (Walb.) Gill & Jordan.

Columbia River and Puget Sound (Jordan & Gilbert).

27635 (Skin). Iliuliuk, Unalashka, July 27, 1880. T. H. Bean.
27636 (Skin). Iliuliuk, Unalashka, July 30, 1880. T. H. Bean.

**102. Oncorhynchus kisutch** (Walb.) Jordan & Gilbert.

San Francisco, Columbia River, and Puget Sound (Jordan & Gilbert).

!28042 (Juv.). Near Hot Springs, Baranoff Island, June 5, 1880. E. P. Herendeen.
27927 (Juv.). Sitka. L. A. Beardslee.
28018 (Juv.). Old Sitka, June 2, 1880. T. H. Bean.
28056 (Juv.). Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
27928 (Juv.). Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
! 27959 (Juv.). Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
27929 (Juv.). Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.
27712 ♂. Iliuliuk, Unalashka, October 12, 1880. Dall & Bean.
27721 ♂ (Skin). Iliuliuk, Unalashka, October 12, 1880. T. H. Bean.
28032 ♂ (Cæca). Iliuliuk, Unalashka, October 12, 1880. T. H. Bean.
27720 ♂ (Skin). Nateekin Bay, Unalashka, October 8, 1880. T. H. Bean.
27722 ♀ (Skin). Nateekin Bay, Unalashka, October 8, 1880. T. H. Bean.
27723 ♂. Nateekin Bay, Unalashka, October 8, 1880. Dall & Bean.
28036 (Cæca). Nateekin Bay, Unalashka, October 8, 1880. Dall & Bean.
27719 ♀ (Skin). Chernoffsky, Unalashka, October 1, 1880. E. P. Herendeen.
27953 (Juv.). Chernoffsky, Unalashka, October 1, 1880. Dall & Bean.
! 23983 (Juv.). Unalashka. W. H. Dall.

**103. Oncorhynchus gorbuscha** (Walb.) Gill & Jordan.

De Castries Bay (Steindachner, as *O. proteus*); Plover Bay, Siberia (Bean); San Francisco, Columbia River, and Puget Sound (Jordan & Gilbert).

27743 ♂ & ♀. Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.
27715 ♂ (Skin). St. Paul, Kodiak, July 11, 1880. T. H. Bean.
27744 ♀. St. Paul, Kodiak, July 11, 1880. Dall & Bean.

## ALEPIDOSAURIDÆ.

**104. Alepidosaurus ferox** Lowe.

! 24052. Unalashka (bad state). W. H. Dall.
27705 (Skin). Iliuliuk, Unalashka, October 7, 1880. Robert King.

**105. Alepidosaurus borealis** Gill.

Puget Sound (Jordan & Gilbert).

23971. Captain's Harbor, Unalashka. Geo. Davidson.

## CLUPEIDÆ.

106. **Clupea mirabilis** Girard.

Kamtchatka (Pallas, as *C. harengus*); San Diego to Puget Sound (Jordan & Gilbert).

27948. Sitka, July, 1879. L. A. Beardslee.
27978. Sitka, May, 1880. L. A. Beardslee.
27977. Old Sitka, June 10, 1880. Dall & Bean.
27979. Port Althorp, June 19, 1880. Dall & Bean.
27949. Port Mulgrave, June 24, 1880. Dall & Bean.
27923. Chugachik Bay, Cook's Inlet, June 30, 1880. E. P. Herendeen.
27984. Chugachik Bay, Cook's Inlet, July 1, 1880. E. P. Herendeen.
27566. Chugachik Bay, Cook's Inlet, July 1, 1880. W. H. Dall.
27524. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.
27718. Iliuliuk, Unalashka, August 1, 1880. Dall & Bean.
27717. Iliuliuk, Unalashka, July 31, 1880. S. Bailey.
24021. Unalashka. W. H. Dall.
20863. St. Michael's, June 10, 1877. L. M. Turner.
20864. St. Michael's, June 10, 1877. L. M. Turner.
28019. Port Clarence, September 8, 1880. Dall & Bean.
24049. Alaska? W. H. Dall.

107. **Spratelloides bryoporus** Cope.

Alaska (Cope).

## CATASTOMIDÆ.

108. **Catostomus longirostris** Le Sueur.

Nulato, Yukon River (Dall).

## MASTACEMBELIDÆ?

109. **Ptilichthys Goodei** Bean.

26619 (Type). Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.

## ACIPENSERIDÆ.

110. **Acipenser medirostris** Ayres.

San Francisco and Columbia River (Jordan & Gilbert).

27697 (202). "Northern Alaska", 1880. Capt. C. L. Hooper.

If this specimen is really Alaskan, it is the first of its kind from that Territory.

## CHIMÆRIDÆ.

111. **Chimæra Colliei** Bennett.

Monterey Bay, San Francisco, and Puget Sound (Jordan & Gilbert); Esquimault Harbor (Günther).

24041. Alaska.
24171 ♂. Alexander Archipelago, July, 1879. Dr. Robert White.

## RAIIDÆ.

112. **Raia binoculata** Girard.

Monterey Bay, San Francisco, and Puget Sound (Jordan & Gilbert).

27667 ♀ (Jaws). Sitka, June 2, 1880. Dall & Bean.
27668 ♀ (Jaws). Sitka, June 3, 1880. Dall & Bean.

27669 (Jaws). Port Althorp, June 20, 1880. Dall & Bean.
27629 ♂ (Jaws). St. Paul, Kodiak, July 10, 1880. Dall & Bean.
27630 ♀ (Jaws). St. Paul, Kodiak, July 10, 1880. Dall & Bean.
27672 ♂. St. Paul, Kodiak, July 23, 1880. Wm. J. Fisher.

**113. Raia parmifera** Bean.

24037 (Jaws and skull). Unalashka. W. H. Dall.
27651 ♀ (Type). Iliuliuk, Unalashka, October 12, 1880. Dall & Bean.
28098 ♂ (Jaws, claspers, &c.). St. Michael's, 1876. L. M. Turner.

**114. Raia batis** Pallas (not Linnæus).

Aleutians, Kuriles, Kamtchatka (Pallas).

## SPINACIDÆ.

**115. Squalus acanthias** Linn.

Santa Barbara, Monterey Bay, San Francisco, and Puget Sound (Jordan & Gilbert).

6756 (Juv.). Sitka. F. Bischoff.
27663 ♂. Sitka Bay, June 9, 1880. S. Bailey.
28048 (Jaws). Sitka Bay, June 9, 1880. S. Bailey.
28049 (Jaws). Port Althorp, June 20, 1880. T. H. Bean.
27616. Off Marmot Island, July 8, 1880. Dall & Bean.

## PETROMYZONTIDÆ.

**116. Ammocœtes aureus** Bean.

21524 (Type). Anvik, Yukon River, 1877. L. M. Turner.
? 24045 (Juv.). Fort Yukon, 1877. L. M. Turner.

# APPENDIX.

Most of the species named in this appendix are known to occur in waters bordering upon the limits of Alaska, and will doubtless be found by future investigators. To these are added certain others, described by Pallas, Tilesius, and Cuvier and Valenciennes, concerning which little is known, but which may yet fall into the hands of collectors in the region under discussion and become established elements of the Alaskan fauna.

## GASTEROSTEIDÆ.

1. **Gasterosteus aculeatus** L. var. **gymnurus** Cuv.
Kamtchatka (Pallas, as *Gasteracanthus aculeatus*).

## PLEURONECTIDÆ.

2. **Pleuronectes pinnifasciatus** Steind. (De Castries Bay.)

3. **Pleuronectes Pallasii** Steind. (Kamtchatka.)

4. **Parophrys vetulus** Girard. (Puget Sound. Jordan & Gilbert.)

5. **Parophrys ischyurus** Jordan & Gilbert. (Puget Sound.)

6. **Pleuronichthys cœnosus** Girard. (Puget Sound. Jordan & Gilbert.)

7. **Hippoglossoides Jordani** Lockington. (Puget Sound. Jordan & Gilbert.)

8. **Hippoglossoides exilis** Jordan & Gilbert. (Puget Sound.)

## GADIDÆ.

9. **Gadus navaga** Kölreuter. (De Castries Bay. Steindachner.)

10. **Merlucius productus** (Ayres) Gill. (De Castries Bay. Steindachner, as *Boreogadus productus*.)

## CONGROGADIDÆ.

11. **Scytalina cerdale** Jordan & Gilbert. (Puget Sound.)

## LYCODIDÆ.

12. **Gymnelis** (?) **stigma** (Bennett) Gthr. (Kotzebue Sound. Lay & Bennett.)

13. **Zoarces elongatus** Kner. (De Castries Bay.)

## STICHÆIDÆ.

14. **Stichæus hexagrammus** var. Kner. (De Castries Bay.)

15. **Stichæus enneagrammus** Kner. (De Castries Bay.)

16. **Stichæopsis nana** Kner. (De Castries Bay.)

## XIPHISTERIDÆ.

17. **Anoplarchus alectrolophus** (Pallas) Jordan & Gilbert. (Talek Island, Gulf of Penshin. Pallas, as *Blennius alectorolophus*.)

18. **Xiphister mucosus** (Girard) Jordan. (Puget Sound. Jordan & Gilbert.)

19. **Apodichthys flavidus** Girard. (Vancouver Island. Günther.)

20. **Apodichthys fucorum** Jordan & Gilbert. (Puget Sound.)

21. **Muræenoides quinquemaculatus** (Kner.). (De Castries Bay. Kner, as *Centronotus quinquemaculatus*).

22. **Muræenoides fasciatus** (Bl. Schn.) Gill. (Amur River. Steindachner, as *Centronotus fasciatus*.)

23. **Muræenoides tænia** (Pall.). (Kuriles. Pallas, as *Blennius tænia*.)

24. **Asternopteryx apus** (C. & V.). (Kamtchatka. Tilesius.)
*Ophidium ocellatum* Tilesius *fide* Günther.
*Blennius gunnellus* Pallas *fide* Günther.

## ANARRHICHADIDÆ.

25. **Anarrhichas orientalis** Pallas. (Kamtchatka.)

26. **Anarrhichthys ocellatus** Ayres. (Puget Sound. Jordan & Gilbert.)

## BLENNIIDÆ.

27. **Blennius** (?) **polyactocephalus** Pallas. (Kamtchatka.)

Perhaps a species of *Carelophus*.

28. **Gunnellops roseus** (Pallas). (Kuriles. Pallas, as *Blennius roseus*.)

## BATRACHIDÆ.

29. **Porichthys porosissimus** (C. & V.) Günther. (Puget Sound. Jordan & Gilbert.)

## GOBIESOCIDÆ ? *fide* Günther.

30. **Cyclopterus** (?) **Stelleri** Pallas. (Kamtchatka.)

31. **Cyclopterus** (?) **ventricosus** Pallas. (Kamtchatka.)

## LIPARIDIDÆ.

32. **Careproctus gelatinosus** (Pallas) Gill. (Kamtchatka. Pallas.)

## AGONIDÆ.

33. **Aspidophoroides inermis** Günther. (Vancouver Island.)

34. **Agonus** (?) **stegophthalmus** Tilesius. (Kuriles.)

35. **Agonus** (?) **lævigatus** Tilesius. (Sagalien Island.)

36. **Brachyopsis dodecaëdrus** (Tiles). (Kamtchatka. Tilesius, as *Agonus-dodekaëdrus*.)

37. **Brachyopsis rostratus** (Tiles.) Gill. (Kamtchatka. Tilesius, as *Agonus rostratus.*)

Kamtchatka and Kuriles (Pallas, as *Phalangistes fusiformis.*)

14936. Kamtchatka. Gordon Prince.

38. **Bothragonus Swanii** (Steind.) Gill. (Puget Sound. Steind., as *Hypsagonus Swani.*)

39. **Hypsagonus quadricornis** (C. & V.) Gill. (Kamtchatka. C. & V., as *Aspidophorus quadricornis.*)

14937. Kamtchatka. Gordon Prince.

## COTTIDÆ.

40. **Ascelichthys rhodorus** Jordan & Gilbert.

Puget Sound (Jordan & Gilbert).

15030. Victoria. Dall & Brown.

41. **Cottus quadricornis** Pallas (? not of Linnæus). Kamtchatka.

42. **Cottus mertensii** C. & V. Kamtchatka.

43. **Cottus jaok** C. & V. Kamtchatka.

44. **Cottus Brandti** Steind. (Amur River.)

45. **Cottus decastrensis** Kner. (De Castries Bay.)

46. **Cottus verrucosus** Bean.

27547 (Type). Plover Bay, Siberia, August 13, 1880. Dall & Bean.

47. **Cottus axillaris** (Gill.) Bean.

*Boreocottus axillaris* Gill.

24027 (Type). Avatcha Bay, Kamtchatka.

48. **Gymnacanthus claviger** (C. & V.). (Kamtchatka. C. & V., as *Cottus claviger.*)

49. **Porocottus tentaculatus** (Kner).

50. **Porocottus quadrifilis** Gill.

6227 (Type). Avatcha Bay, Kamtchatka. Wm. Stimpson.
27537. Plover Bay, Siberia, September 14, 1880. Dall & Bean.

51. **Megalocottus platycephalus** (Pallas) Gill.

Kamtchatka & America—(Pallas, as *Cottus platycephalus.*)

52. **Icelus hamatus** Kröyer.

27540 (Juv.). Plover Bay, Siberia, September 14, 1880. Dall & Bean.
27551 (Juv.). Plover Bay, Siberia, September 14, 1880. Dall & Bean.

53. **Artedius lateralis** Girard. (Puget Sound. Jordan & Gilbert.)

54. **Artedius pugettensis** Steind. (Puget Sound. Steind. & Jor. & Gilb.)

55. **Scorpænichthys marmoratus** Girard. (Puget Sound. Jor. & Gilb.)

## SCORPÆNIDÆ.

56. **Sebastichthys nigrocinctus** (Ayres) Gill.

Puget Sound (Jordan & Gilbert); Vancouver Island (Gill).

57. **Sebastichthys nebulosus** (Ayres) Gill.

Puget Sound (Jordan & Gilbert); Vancouver Island (Gill).

58. **Sebastichthys auriculatus** (Girard) Gill. (Vancouver Island. Gill.)

59. **Sebastichthys pinniger** (Gill.) Lockington. (Puget Sound. Jordan & Gilbert.)

60. **Sebastichthys mystinus** Jordan & Gilbert. (Puget Sound.)

## FAMILY UNKNOWN.

61. **Ammodytes** (?) **septipinnis** Pallas. America.

## EMBIOTOCIDÆ.

62. **Damalichthys argyrosomus** (Girard) Jor. & Gilb.

Puget Sound (Jor. &. Gilb.); Vancouver Island (Gill).

63. **Ditrema Jacksoni** (Agassiz) Gthr. (Puget Sound. Jor. & Gilb.)

64. **Ditrema laterale** (Agassiz) Gthr. (Vancouver Island. Günther.)

65. **Ditrema brevipinne** Günther. Vancouver Island.

66. **Micrometrus aggregatus** Gibbons.

Puget Sound (Jor. & Gilb.); Vancouver Island (Günther).

67. **Micrometrus frenatus** (Gill.) Jordan & Gilbert.

Puget Sound (Jor. & Gilb.); Vancouver Island (Gill).

## STROMATEIDÆ.

68. **Stromateus simillimus** (Ayres) Gill. (Puget Sound. Jordan & Gilbert.)

## PERCIDÆ.

69. **Stizostedium vitreum** (Mitch.) Jordan & Copeland.

8469. North Red River. R. Kennicott.
8970. Athabasca Lake. R. Kennicott.

## TRACHYPTERIDÆ.

70. **Trachypterus altivelis?** Kner. (Puget Sound.)

## SCOPELIDÆ.

71. **Myctophum crenulare** Jordan & Gilbert.

Santa Barbara (Jor. & Gilb.).

23945. N. Lat. 49°, W. Long. 151°, September 15, 1871. W. H. Dall.

## MICROSTOMIDÆ.

72. **Osmerus attenuatus** Lockington.

San Francisco (Jordan & Gilbert).

21587. Washington Territory. James G. Swan.

## COREGONIDÆ.

73. **Coregonus Artedi** (Le S.) Hoy.

Great Lake Region and Upper Mississippi Valley to Alaska (Jordan). I have seen no specimens of this species from Alaska. *C. laurettæ* resembles it but is quite distinct.

74. **Coregonus microstomus** (Pallas). (Kamtchatka, &c.)

75. **Stenodus Mackenzii** Richardson.

Mackenzie River with its tributaries (Rich.).

7262 (Skin). Fort Resolution, May 7. R. Kennicott.

76. **Thymallus vulgaris** (*fide* Günther).

*Salmo thymallus* Pallas (part). (Kamtchatka.)

77. **Thymallus mertensii** C. & V. (Kamtchatka.)

## SALMONIDÆ.

78. **Salmo curilus** Pallas. Kurile Islands.

79. **Salmo leucomænis** Pallas. (? *Salvelinus malma* [Walb.] Jor. & Gilb.)

Kamtchatka and northward (Pallas).

80. **Salmo lævigatus** Pallas. Kurile Islands.

*Salmo lagocephalus*, *sanguinolentus*, *japonensis*, *lycaodon*, *proteus*, and *orientalis* of Pallas may doubtless all be reduced to the five species of *Oncorhynchus* now recognized from the Alaskan coast.

## PARALEPIDIDÆ.

81. **Paralepis coruscans** Jordan & Gilbert. (Puget Sound.)

## ENGRAULIDIDÆ.

82. **Stolephorus ringens** (Jenyns) Jordan & Gilbert.

Puget Sound (Jor. & Gilb.); Vancouver Island (Gill).

## NEMICHTHYIDÆ.

83. **Nemichthys avocetta** Jordan & Gilbert. (Puget Sound.)

## CONGRIDÆ.

84. **Conger** sp. (=*Muræna conger* Pallas). (Kamtchatka.)

## ACIPENSERIDÆ.

85. **Acipenser transmontanus** Richardson. (Puget Sound. Jor. & Gilb.)

## RAIIDÆ.

86. **Raia rhina** Jordan & Gilbert. (Puget Sound.)

87. **Raia fullonica** Pallas (not Linn.). (Kamtchatka and Kuriles.)

88. **Raia mucosa** Pallas. (Kamtchatka.)

## NOTIDANIDÆ.

89. **Hexanchus corinus** Jordan & Gilbert. (Puget Sound.)

## CETORHINIDÆ.

90. **Cetorhinus maximus** (L.) Blainville. (Monterey Bay, Jor. & Gilb.)

## GALEORHINIDÆ.

91. **Squalus carcharias** Pallas. (Kamtchatka.) ?(=*Eulamia lamia* [Risso] Gill.)
San Diego (Jordan & Gilbert).

92. **Galeorhinus galeus** (L.) Blainville.
San Diego to San Francisco (Jordan & Gilbert).

93. **Boreogaleus arcticus** (Faber) Gill. (Arctic Seas. Günther.)

94. **Carcharinus glaucus** (L.) Blainville. (Puget Sound. Jordan & Gilbert.)

## SCYMNIDÆ.

95. **Somniosus microcephalus** (Bloch) Gill. (Puget Sound. Jordan & Gilbert.)

## PETROMYZONTIDÆ.

96. **Petromyzon lampetra** Pallas (=*Petromyzon marinus* L. *fide* Günther).
Okhotsk Sea (Pallas).

97. **Entosphenus tridentatus** (Richardson) Gill. (Columbia River. Jor. & Gilb.)

98. **Ammocœtes plumbeus** (Ayres) Jor. & Gilb. (Puget Sound. Jor. & Gilb.)

99. **Ammocœtes lumbricalis** (Pallas). (=*Petromyzon branchialis* L. *fide* Gth.)
Jenesei River and streams of Kamtchatka (Pallas).

## SPECIES NOT YET FOUND ELSEWHERE THAN IN ALASKA.

**(The numbers prefixed refer to my catalogue.)**

8. **Pleuronectes quadrituberculatus.**

31. **Muraenoides maxillaris.**

32. **Anarrhichas lepturus.**

45. **Cottus niger.**

46. **Cottus humilis.**

49. **Uranidea microstoma.**

50. **Gymnacanthus galeatus.**

55. **Melletes papilio.**

69. **Sebastichthys ciliatus.**

70. **Hexagrammus ordinatus.**

73. **Hexagrammus scaber.**

75. **Pleurogrammus monopterygius.**

79. **Ammodytes alascanus.**

80. **Dallia pectoralis.**

89. **Coregonus laurettæ.**

107. **Spratelloides bryoporus.**

109. **Ptilichthys Goodei.**

113. **Raia parmifera.**

116. **Ammocœtes aureus.**

## FRESH-WATER FISHES COMMON TO ALASKA AND EASTERN NORTH AMERICA.

19. **Lota maculosa.**

81. **Esox lucius.**

73 (App.). **Coregonus artedi.** (Great Lakes.)

91. **Coregonus clupeiformis.** (Great Lakes.)

93. **Coregonus quadrilateralis.** (New Hampshire.)

95. **Salvelinus malma.** (New York, introduced from California.)

98. **Salmo irideus.** (Introduced from California.)

99. **Oncorhynchus chouicha.** (Introduced from California.)

108. **Catostomus longirostris.** (Vermont.)

## FISHES FOUND IN THE ARCTIC AND ALSO IN THE PACIFIC, SOUTH OF BERING STRAIT.

15. **Boreogadus saida.**

20. **Gymnelis viridis.**

23. **Stichæus punctatus.**

22 (App.). **Murænoides fasciatus.**

35. **Eumicrotremus spinosus.**

50. **Gymnacanthus pistilliger.**

52 (App.). **Icelus hamatus.**

59. **Triglops Pingelii.**

78. **Ammodytes americanus.**

85. **Mallotus villosus.**

95 (App.). **Somniosus microcephalus.**

## SPECIES FOUND IN THE PACIFIC, SOUTH OF BERING STRAIT, AND ALSO IN THE ATLANTIC.

3. **Gasterosteus pungitius subsp. brachypoda.**

12. **Hippoglossus vulgaris.**

16. **Gadus morrhua.**

20. **Gymnelis viridis.**

23. **Stichæus punctatus.**

35. **Eumicrotremus spinosus.**

50. **Gymnacanthus pistilliger.**

52 (App.). **Icelus hamatus.** (N. lat. 58°. Collett.).

59. **Triglops Pingelii.**

64. **Hemitripterus americanus.**

78. **Ammodytes americanus.**

85. **Mallotus villosus.**

104. **Alepidosaurus ferox.**

115. **Squalus acanthias.**

95 (App.). **Somniosus microcephalus.**

## ALASKAN SPECIES OCCURRING SOUTH TO SAN FRANCISCO OR BEYOND.

5. **Pleuronectes stellatus** Pall.

9. **Lepidopsetta bilineata.**

12. **Hippoglossus vulgaris** Flem.

13. **Atheresthes stomias** Jor. & Gilb.

14. **Pollachius chalcogrammus** (Pall.) Jor. & Gilb.

17. **Microgadus proximus** (Grd.) Gill.

53. **Hemilepidotus trachurus** (Pall.) Gthr.

65. **Sebastichthys maliger** Jor. & Gilb.

67. **Sebastichthys ruber** (Ayres) Lock.

68. **Sebastichthys melanops** (Grd.) Jor. & Gilb.

72. **Hexagrammus superciliosus** (Pall.) Jor. & Gilb.

74. **Hexagrammus decagrammus** (Pall.) Jor. & Gilb.

76. **Ophiodon elongatus** Grd.

77. **Anoplopoma fimbria** (Pall.) Gill.

78. **Ammodytes americanus** DeKay.

87. **Hypomesus pretiosus** (Grd.) Gill.

95. **Salvelinus malma** (Walb.) Jor. & Gilb.

96. **Salmo purpuratus** Pall.

97. **Salmo Gairdneri** Rich.

98. **Salmo irideus** Gibbons.

99. **Oncorhynchus chouicha** (Walb.) Jor. & Gilb.

100. **Oncorhynchus keta** (Walb.) Gill & Jor.

102. **Oncorhynchus kisutch** (Walb.) Jor. & Gilb.

103. **Oncorhynchus gorbuscha** (Walb.) Gill & Jor.

106. **Clupea mirabilis** Grd.

110. **Acipenser medirostris** Ayres.

## ALASKAN SPECIES OCCURRING SOUTH TO COLUMBIA RIVER.

88. **Thaleichthys pacificus** (Rich.) Grd.

101. **Oncorhynchus nerka** (Walb.) Gill & Jor.

## ALASKAN SPECIES OCCURRING AS FAR SOUTH AS PUGET SOUND.

11. **Hippoglossoides elassodon** Jor. & Gilb.

16. **Gadus morrhua** L.

44. **Cottus polyacanthocephalus** Pall.

66. **Sebastichthys caurinus** (Rich.) Jor. & Gilb.

70. **Hexagrammus asper** Steller. (*Labrax Hexagrammus* Pall.)

33. **Bathymaster signatus** Cope.

### SYNOPSIS OF THE DISTRIBUTION OF ALASKAN FISHES.

| | Atlantic. | Arctic. | Pacific south of Bering Strait. | Puget Sound. | San Francisco. |
|---|---|---|---|---|---|
| 1. *Gasterosteus cataphractus* | | | + | + | + |
| 2. *Gasterosteus microcephalus* | | | + | + | + |
| 3. *Gasterosteus pungitius* subsp. *brachypoda* | + | | + | | |
| 4. *Aulorhynchus flavidus* | | | + | + | + |
| 5. *Pleuronectes stellatus* | | + | + | + | + |
| 6. *Pleuronectes glacialis* | | + | + | | |
| 7. *Pleuronectes Franklinii* | | + | | | |
| 8. *Pleuronectes quadrituberculatus* | | | + | | |
| 9. *Lepidopsetta bilineata* | | | + | + | + |
| 10. *Limanda aspera* | | | + | | |
| 11. *Hippoglossoides elassodon* | | | + | + | |
| 12. *Hippoglossus vulgaris* | + | | + | + | + |
| 13. *Atheresthes stomias* | | | + | | + |
| 14. *Pollachius chalcogrammus* | | | + | + | + |

*Synopsis of the distribution of Alaskan fishes*—Continued.

| | Atlantic. | Arctic. | Pacific south of Bering Strait. | Puget Sound. | San Francisco. |
|---|---|---|---|---|---|
| 15. *Boreogadus saida* | ...... | + | + | ...... | ...... |
| 16. *Gadus morrhua* | + | ...... | + | + | ...... |
| 17. *Microgadus proximus* | ...... | ...... | + | + | + |
| 18. *Tilesia gracilis* | ...... | ...... | + | ...... | ...... |
| 19. *Lota maculosa* | ...... | ...... | + | ...... | ...... |
| 20. *Gymnelis viridis* | + | + | + | ...... | ...... |
| 21. *Lycodes Turnerii* | ...... | ...... | + | ...... | ...... |
| 22. *Lycodes coccineus* | ...... | + | + | ...... | ...... |
| 23. *Stichæus punctatus* | + | + | + | ...... | ...... |
| 24. *Stichæus* (?) *Rothrockii* | ...... | + | + | ...... | ...... |
| 25. *Lumpenus anguillaris* | ...... | + | + | + | + |
| 26. *Xiphister rupestris* | ...... | ...... | + | + | + |
| 27. *Xiphister chirus* | ...... | ...... | + | + | + |
| 28. *Anoplarchus atropurpureus* | ...... | ...... | + | + | + |
| 29. *Murænoides dolichogaster* | ...... | ...... | + | ...... | ...... |
| 30. *Murænoides ornatus* | ...... | ...... | + | + | ...... |
| 31. *Murænoides maxillaris* | ...... | ...... | + | ...... | ...... |
| 32. *Anarrhichas lepturus* | ...... | ...... | + | ...... | ...... |
| 33. *Bathymaster signatus* | ...... | ...... | + | + | ...... |
| 34. *Trichodon stelleri* | ...... | ...... | + | ...... | ...... |
| 35. *Eumicrotremus spinosus* | + | + | + | ...... | ...... |
| 36. *Liparis pulchellus* | ...... | ...... | + | ...... | + |
| 37. *Liparis calliodon* | ...... | ...... | + | ...... | ...... |
| 38. *Liparis cyclopus* | ...... | ...... | + | ...... | ...... |
| 39. *Liparis gibbus* | ...... | ...... | + | ...... | ...... |
| 40. *Siphagonus barbatus* | ...... | ...... | + | ...... | ...... |
| 41. *Podothecus acipenserinus* | ...... | +(?) | + | + | ...... |
| 42. *Podothecus trispinosus* | ...... | ...... | + | ...... | + |
| 43. *Cottus tæniopterus* | ...... | + | + | ...... | ...... |
| 44. *Cottus polyacanthocephalus* | ...... | +(?) | + | + | ...... |
| 45. *Cottus niger* | ...... | ...... | + | ...... | ...... |
| 46. *Cottus humilis* | ...... | + | + | ...... | ...... |
| 47. *Aspidocottus bison* | ...... | ...... | + | + | + |
| 48. *Ceratocottus diceraus* | ...... | ...... | + | ...... | ...... |
| 49. *Uranidea microstoma* | ...... | ...... | + | ...... | ...... |
| 50. *Gymnacanthus pistilliger* | + | + | + | ...... | ...... |
| 51. *Gymnacanthus galeatus* | ...... | +(?) | + | ...... | ...... |
| 52. *Artedius notospilotus* | ...... | ...... | + | + | + |
| 53. *Hemilepidotus trachurus* | ...... | ...... | + | + | + |
| 54. *Hemilepidotus Jordani* | ...... | ...... | + | ...... | ...... |
| 55. *Melletes papilio* | ...... | ...... | + | ...... | ...... |
| 56. *Leptocottus armatus* | ...... | ...... | + | + | + |
| 57. *Oligocottus maculosus* | ...... | ...... | + | + | + |
| 58. *Oligocottus globiceps* | ...... | ...... | + | + | + |
| 59. *Triglops Pingelii* | + | + | + | ...... | ...... |
| 60. *Blepsias cirrhosus* | ...... | ...... | + | + | + |
| 61. *Blepsias bilobus* | ...... | ...... | + | ...... | ...... |
| 62. *Nautichthys oculofasciatus* | ...... | ...... | + | + | + |
| 63. *Rhamphocottus Richardsoni* | ...... | ...... | + | ...... | +(?) |
| 64. *Hemitripterus americanus* | + | ...... | + | ...... | ...... |
| 65. *Sebastichthys maliger* | ...... | ...... | + | + | + |
| 66. *Sebastichthys caurinus* | ...... | ...... | + | + | ...... |
| 67. *Sebastichthys ruber* | ...... | ...... | + | + | + |
| 68. *Sebastichthys melanops* | ...... | ...... | + | + | + |
| 69. *Sebastichthys ciliatus* | ...... | ...... | + | ...... | ...... |
| 70. *Hexagrammus asper* | ...... | ...... | + | + | ...... |
| 71. *Hexagrammus ordinatus* | ...... | ...... | + | ...... | ...... |
| 72. *Hexagrammus superciliosus* | ...... | ...... | + | + | + |
| 73. *Hexagrammus scaber* | ...... | ...... | + | ...... | ...... |
| 74. *Hexagrammus decagrammus* | ...... | ...... | + | + | + |
| 75. *Pleurogrammus monopterygius* | ...... | ...... | + | ...... | ...... |
| 76. *Ophiodon elongatus* | ...... | ...... | + | + | + |
| 77. *Anoplopoma fimbria* | ...... | ...... | + | + | + |
| 78. *Ammodytes americanus* | + | + | + | + | + |
| 79. *Ammodytes alascanus* | ...... | ...... | + | ...... | ...... |
| 80. *Psychrolutes paradoxus* | ...... | ...... | + | ...... | ...... |
| 81. *Esox lucius* | ...... | ...... | + | ...... | ...... |
| 82. *Dallia pectoralis* | ...... | ...... | + | ...... | ...... |
| 83. *Osmerus dentex* | ...... | ...... | + | ...... | ...... |
| 84. *Osmerus spirinchus* | ...... | + | ...... | ...... | ...... |
| 85. *Mallotus villosus* | + | + | + | ...... | ...... |
| 86. *Hypomesus olidus* | ...... | ...... | + | ...... | ...... |
| 87. *Hypomesus pretiosus* | ...... | ...... | + | + | + |
| 88. *Thaleichthys pacificus* | ...... | ...... | + | + | ...... |
| 89. *Coregonus laurettæ* | ...... | + | + | ...... | ...... |

*Synopsis of the distribution of Alaskan fishes*—Continued.

| | Atlantic. | Arctic. | Pacific south of Bering Strait. | Puget Sound. | San Francisco. |
|---|---|---|---|---|---|
| 90. *Coregonus Merckii var.* | | + | + | | |
| 91. *Coregonus clupeiformis* | | + | + | | |
| 92. *Coregonus Kennicottii* | | | + | | |
| 93. *Coregonus quadrilateralis* | | + | + | | |
| 94. *Thymallus signifer* | | + | + | | |
| 95. *Salvelinus malma* | | + | + | + | |
| 96. *Salmo purpuratus* | | | + | + | + |
| 97. *Salmo Gairdneri* | | | + | + | + |
| 98. *Salmo irideus* | | | + | + | + |
| 99. *Oncorhynchus chouicha* | | | + | + | + |
| 100. *Oncorhynchus keta* | | | + | + | + |
| 101. *Oncorhynchus nerka* | | | + | + | |
| 102. *Oncorhynchus kisutch* | | | + | + | + |
| 103. *Oncorhynchus gorbuscha* | | + | + | + | + |
| 104. *Alepidosaurus ferox* | + | | + | | |
| 105. *Alepidosaurus borealis* | | | + | + | |
| 106. *Clupea mirabilis* | | | + | + | + |
| 107. *Spratelloides bryoporus* | | | + | | |
| 108. *Catostomus longirostris* | | | + | | |
| 109. *Ptilichthys Goodei* | | | + | | |
| 110. *Acipenser medirostris* | | | + | | + |
| 111. *Chimæra Colliei* | | | + | + | + |
| 112. *Raia binoculata* | | | + | + | + |
| 113. *Raia parmifera* | | | + | | |
| 114. *Raia batis* Pallas | | | + | | |
| 115. *Squalus acanthias* | + | | + | + | + |
| 116. *Ammœtes aureus* | | | + | | |
| 52 (App.). *Icelus hamatus* | + | + | + | | |
| 95 (App.). *Somniosus microcephalus* | + | + | + | + | |

## METHODS OF MAKING AND PRESERVING PLASTER CASTS.

### By ANTHONY PIRZ.

LONG ISLAND CITY, N. Y.,
*October* 28, 1881.

DEAR SIR: In using the method of preserving plaster casts with baryta water and soap as given some time ago, it happens that larger pieces remain damp a long time (years) and yellow iron spots readily appear on the plaster. V. Dechend, in Bonn, recommends brushing the casts with a hot saturated solution of borax twice, and larger pieces five to six times. Then apply twice a saturated and hot solution of chloride of baryta, and finally a hot solution of soap; the superfluous soap solution is to be washed off with hot water, and lastly with cold water. The whole treatment occupies but a few hours.

W. Reisig, in Darmstad, recommends covering the plaster casts with a solution of India rubber in benzole, or petroleum ether, or bisulphide of carbon. The casts so treated can be washed.

R. Jacobsen's plan to make plaster casts stand the washing is: to saturate the casts hot with a solution of a most neutral soap from soda lye and stearic acid in 10 parts of boiling water.

I. W. Platonoff, in Moscow, prepares a mass for casts as follows: take 50 parts glue, 35 parts wax, and 15 parts glycerine, with 30 per cent. zinc oxide. It becomes as hard as horn. A softer mass consists of 50 parts glue, 25 parts wax, and 25 parts glycerine. To prepare the mass, dissolve the glue in warm glycerine, then add the wax, and lastly the metal oxide.

R. Martin, in Sonneberg, mixes 20 to 100 parts zinc oxide with 5 to 10 parts tartaric acid or calcined alum and 100 parts starch (finely powdered), and the required quantity of water to form the casts. If these articles are at a temperature below 15° Celsius and are poured in warm molds, the cast becomes brittle, but is at once made plastic by being placed in a water-bath of 50°. Then give the casts a surface which permits washing by collodion, which is mixed with a solution of wax in ether.

My method of preparing caustic baryta is: Take carbonate baryta, pulverize and mix with charcoal, put in a crucible well ? *luted* and expose in a white fire. Then leach with boiled water and let crystallize. As the caustic baryta so greedily absorbs the carbonic acid from the air, I give this simple cheap method, so that your department can often make the caustic baryta new, when the old has turned into carbonate baryta.

I have written these various methods and you can select what pleases you.

I shall be under great obligations to you, if you will send me the survey and publication when ready.

I remain, dear sir, yours very truly,

ANTHONY PIRZ.

Hon. SPENCER F. BAIRD,
*Secretary Smithsonian Institution, Washington, D. C.*

## LIST OF FISHES COLLECTED BY LIEUT. HENRY E. NICHOLS, U. S. N., IN THE GULF OF CALIFORNIA AND ON THE WEST COAST OF LOWER CALIFORNIA, WITH DESCRIPTIONS OF FOUR NEW SPECIES.

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

The specimens of fishes collected by Lieut. Henry E. Nichols, commandant of the United States Coast and Geodetic Survey Steamer Hassler, in his voyage along the coast of Mexico and Central America, have been already noticed by us on page 225 of the present volume of the Proceedings of the United States National Museum. On the northward voyage of the Hassler (January–March, 1881), Lieutenant Nichols made another collection, also of much importance. A list of the species obtained, with their numbers as recorded in the register of the museum, is given below.

It will be noticed that all the species obtained from the west coast of Lower California belong to the Californian fauna, while nearly all of those obtained within the Gulf are members of the tropical fauna of the west coast of Mexico. It is a fact worthy of note that very few of the fishes found along the southern coast of California extend their range as far southward as Cape San Lucas or Mazatlan. Only about ten species of shore fishes are known to occur both at San Diego and Mazatlan. In the region between San Diego and Magdalena Bay, the Californian fauna and its characteristic species almost wholly disappear, giving place gradually to the tropical fauna of the west coast of Mexico. Even the *Labridæ*, *Pomacentridæ*, and *Sciænidæ* of California do not extend southward to Mazatlan.

### A.—SPECIES FROM THE GULF OF CALIFORNIA.

29,377. *Serranus radialis* (Quoy & Gaim.) J. & G. Punta San Ignacio, Mexico.

29,388. *Mugil mexicanus* Steind. Same locality.

29,353, 29,363, 29,373. *Tetrodon politus* Ayres. Same locality.

29,362. *Cynoscion parvipinne* Ayres. Guaymas, Mexico.

29,386. *Pomadasys ? inornatus* (Gill) J. & G. Guaymas, Mexico.

This specimen has 58 scales in a longitudinal series, the dorsal and anal fins almost naked, the anal rays III, 11, and the snout rather long, more than one-third length of head. It differs in all these respects from the description of *Pristipoma brevipinne* Steindachner = ? *Microlepidotus inornatus* Gill.

29,355. *Gerres californiensis* (Gill) J. & G. Guaymas, Mexico.

29,800. *Gerres gracilis* (Gill) J. & G. Guaymas, Mexico.

29,357. *Hemirhamphus unifasciatus* Ranzani. Guaymas, Mexico.

29,356. *Mugil brasiliensis* Agass. Guaymas, Mexico.

29,368. *Porichthys porosissimus* (C. & V.) Gthr. Gulf of California (dredged in 15 fathoms).

29,385. *Cynoscion othonopterum* sp. nov. Punta San Felipe, Mexico.

*Description.*—Body rather elongate, the back somewhat elevated, the profile from tip of snout to front of dorsal nearly straight; caudal peduncle rather long and slender, its depth 4 in head. Head long and pointed, compressed, not regularly conical. Mouth large, the lower jaw projecting; maxillary broad, reaching to or a little beyond posterior margin of orbit; premaxillaries in front on the level of lower part of pupil; length of gape 2¼ in head. Teeth in upper jaw in a moderate band, which becomes narrower laterally; upper jaw with two small canines, their length scarcely one-fourth diameter of pupil; some of the other anterior teeth enlarged, and larger than the lateral teeth. Teeth in lower jaw in a narrow band in front, in a single series laterally; the lateral teeth much larger than the anterior. Eye moderate, broader than preorbital, narrower than maxillary; its diameter 6⅔ in head, a little more than half interorbital space. Preopercle with its membranaceous border broad, and covered with small scales. Gill-rakers long and strong, nearly as long as eye. Scales small, all with conspicuous membranaceous edges. All the fins excepting spinous dorsal completely covered with small scales, the bases of the fins thickened by them; a few scales on front of spinous dorsal. Lateral line considerably curved anteriorly, becoming straight at a point in front of the vent, near the origin of the soft dorsal. Dorsal spines comparatively long and strong, little flexible; the third spine slightly longer than the second, $2\frac{3}{4}$ in length of head; first spine short and slender, about $\frac{1}{3}$ length of second. Dorsals not connected; second dorsal rather high, its longest rays $3\frac{1}{2}$ in head. Caudal fin large, *lunate*, the outer rays about $\frac{1}{3}$ longer than the middle rays, which are $2\frac{1}{4}$ in head. (In *C. squamipinne* the caudal fin is rhombic, having the middle rays produced, much longer than the outer rays.) Anal large, as long as high, its distal margin perfectly straight; its longest rays about one-third length of head. Anal spines small, enveloped in the scaly skin, the second about $\frac{1}{3}$ height of first soft ray. Anal fin terminating considerably in front of dorsal. Ventrals long, not reaching quite half way to vent, their length about half that of head. Pectorals broad, rather long, reaching a little beyond tips of ventrals, and contained $1\frac{3}{4}$ in length of head. Head $3\frac{1}{10}$ in length; depth 4. D. IX–I, 23; A. II, 10; Lat. l. 66 (pores 60).

Slaty bluish above, silvery below, with bright reflections; body and fins everywhere with dark punctulations; tip of chin dark; fins yellowish, the upper all with dark edging; pectorals blackish on the posterior side; the axil and the large axillary scale dusky; lower jaw bright silvery; lining of opercle dark; peritoneum pale.

A single large specimen, 23 inches long, was taken at Punta San Felipe, Mexico. Lieutenant Nichols notes that it is very abundant in that locality.

This species agrees with *C. squamipinne*, and differs from all other known species of the genus in the complete squamation of the fins.

29,366. *Stolephorus opercularis* sp. nov. Punta San Felipe.

Allied to *S. macrolepidotus* (Kner & Steindachner).

Body elliptical, rather short and deep, compressed, but not very strongly so, more elongate than in *S. macrolepidotus;* dorsal outline evenly curved; belly compressed, not trenchant. Apparently *not* translucent in life.

Head large, compressed, the snout bluntish, overlapping the lower jaw, the tip of which is just in front of the eye; maxillary comparatively short and slender, not extending backward to mandibulary joint or to margin of preopercle. Maxillary with extremely fine, hardly perceptible teeth; mandible toothless.

Cheeks forming a triangular area, the apex downward and backward, the triangle lower and much broader than usual, the base (at the eye) being four-fifths the length of the other sides. Eye moderate, $1\frac{2}{3}$ in length of cheeks, much longer than snout, 4 in head. Anterior ridge of preopercle prominent, the posterior membranaceous edge little conspicuous. Opercular region unusually long; distance from ridge of preopercle at lower posterior angle of cheeks backward to gill-opening equal to distance from same point forward to middle of eye. Length of opercle, from anterior ridge of preopercle, three-fourths its greatest height.

Insertion of dorsal midway between base of caudal and middle of eye [caudal and dorsal fins nearly destroyed in type]; anal comparatively short and posterior, its insertion midway between gill-opening and base of caudal, its rays between 20 and 24 in number [two or three of the posterior rays destroyed by a string which has been tied around the tail in the type specimen]. Anal fin with a large scaly sheath. Ventrals small, inserted midway between base of caudal and front of eye. Pectorals short, not reaching ventrals.

Scales large, rather adherent [those on anterior part of body lost]; about 8 in a vertical series from last ray of dorsal to anal.

Head 3 in length; depth, 4. Anal rays about 23.

Color, bluish above; middle line of back dark; sides and below bright silvery, the cheeks and opercles especially so; no trace of lateral silvery stripe.

The type of this species, 5 inches in length, was taken from the stomach of a specimen of *Cynoscion othonopterum* at Punta San Felipe, Mexico. It has suffered somewhat from the digestive process, but the head is in perfect preservation, and all points essential to the description can be readily made out. This species seems to us most closely related, among described species, to *S. macrolepidotus*, from which it differs in very many respects.

29,372. *Caulolatilus princeps* (Jenyns) Gill. Punta Santa Teresa (in deep water).

29,370. *Balistes polylepis* Steind. Same locality.

29,382. *Opisthognathus rhomalcus* sp. nov. Santa Maria.

(Subgenus *Gnathypops* Gill; allied to *Gnathypops papuensis* Bleeker.)

Body rather robust, compressed; head very large, ovoid, thicker and deeper than body, with swollen cheeks, the occipital region high, the snout somewhat truncate, the intermediate profile forming a nearly even curve; greatest depth of head equal to its thickness and two-thirds its length. Eye not very large, 6 in head, longer than snout, about equal to the width of the flattish interorbital space.

Mouth large, the maxillary extending well beyond eye, but not to the margin of the preopercle nor to the mandibulary joint, its posterior margin truncate; supplemental bone small, but distinct; length of maxillary from end of snout 1¾ in head. Teeth moderate, in both jaws, in broad bands which become narrow on the sides; outer series of teeth somewhat enlarged, especially in upper jaw; one rather small, blunt tooth on middle of vomer. Gill-membranes scarcely connected.

Head naked. Scales on body small, smooth, somewhat imbedded; breast naked. Lateral line indistinct, ceasing opposite anterior third of second dorsal; 103 scales in a longitudinal series from head to caudal.

Dorsal fin high; a rather deep notch separating the spines from the soft rays; the longest spines 3 in length of head, more than half longer than the last spine, and scarcely lower than the soft rays. Insertion of dorsal opposite tip of the bony opercle, the opercular flap extending to opposite the third spine. Caudal fin rounded, about half length of head. Anal higher than soft dorsal, its longest rays 2¼ in head. Ventrals large, close together, inserted in front of pectoral, 1⅕ in head. Pectorals short and broad, 1⅞ in head.

Head 2⅞ in length to base of caudal; greatest depth 4. Dorsal rays XI, 13; A. II, 13. Lat. l, 103.

Color in spirits, olivaceous, slightly brownish above, scarcely paler below; everywhere more or less tinged and mottled with greenish. Head everywhere thickly and closely covered with small rounded dark brown spots, largest above and on cheeks, where they are about as large as pin's heads; smaller on lips and opercles; most thickly set on the anterior part of the head. Eye thickly spotted. Spots similar to those on the head extending along upper part of back, forming a vague band, which grows narrower backward and disappears opposite front of second dorsal; front side of pectoral and first three or four dorsal spines with dark spots. Dorsal dusky olive, with darker clouds, and with some dark spots, especially on the spinous part. Caudal and anal plain dusky or faintly marbled with paler; ventrals blackish, greenish at base; pectorals dusky green.

The single specimen obtained (29,382) is 16 inches in length, being unusually large for a member of this genus. It was taken with a hook in Santa Maria Cove, in Lower California.

29,358. *Mugil brasiliensis* Ag. Mulege, L. Cal.
29,359. *Muræna pinta* J. & G. (MSS.) Amortajada Bay, San Josef Island.
29,384. *Nematistius pectoralis* Gill. Pichelnogo, L. Cal.
29,380. *Sparus brachysomus* Lockington. Same locality.
29,378. *Fistularia serrata* Cuv. Same locality.
29,351. *Balistes polylepis* Steind. Cape San Lucas.
29,354. *Ophichthys callisoma* (Abbott) J. & G. Same locality.

This species is probably not identical with *Ophichthys triserialis* (Kaup) Gthr.

## B.—SPECIES FROM THE WEST COAST OF LOWER CALIFORNIA.

29,371. *Umbrina roncador* sp. nov. Pequeña Bay.

*Umbrina undulata* Steindachner, Ichth. Beiträge, iii, 21, 1875, and Denkschrift. Math-Naturw. Kais. Acad. Gesell. Wien, xli, 1879, 35 (reprint); not of Girard, whose type, examined by us, is a *Menticirrus*.

*Umbrina xanti* Jor. & Gilb., Proc. U. S. Nat. Mus., 1880, 456, and 1881, 48 (not of Gill).

*Description.*—Body moderately elongate, the back somewhat elevated, the curve from the snout to the dorsal comparatively regular; the slope behind front of dorsal also regular, but less steep. Head conical, bluntish, the snout considerably protruding; mouth moderate, horizontal, the maxillary extending to behind the pupil; eye moderate, 1½ in snout, 5½ in head; preopercle with its bony margin finely serrate; teeth in villiform bands, the outer row moderately enlarged in the upper jaw. Gill-rakers moderate, bluntish.

Spinous dorsal rather low, the fourth spine highest, about half the length of the head. Soft dorsal long and low, its membranes scaly. Caudal lunate, its upper lobe the longer. Anal small, the second spine rather strong, 2⅔ in head. Pectorals short and small, not reaching half way to vent and not nearly to tip of ventrals, their length two-thirds that of head.

Air-bladder well developed; pyloric cœca 8.

Head 3⅘ in length; depth 3⅓; D.X–I, 27; A. II, 7.

Lat. l. with tubes on about 55 scales; about 60 scales in a longitudinal series.

Color bright silvery, bluish above, with some brassy reflections; sides with narrow, distinct, undulating stripes of deep olive running from the head and pectoral region upwards and backwards with some abrupt curvatures to along the base of the dorsal, those below the lateral line most undulated; usually between each pair of bands are some small olive spots, often forming regular series; no distinct vertical bars, faint cross-shades rarely present; cheeks clear white; lower fins yellow; upper fins and caudal plain clear brown; peritoneum and lining membrane of opercles chiefly black.

This species is the "Yellow-finned Roncador" of the California fishermen, and occurs in abundance along the coast of California from Santa Barbara to San Diego. Its southernmost record is the present one from Pequeña Bay.

It was formerly erroneously identified by us with the related species *Umbrina xanti* Gill (= *Umbrina analis* Günther), which takes its place to the southward (Cape San Lucas, *Gill*, to Tumbez, Peru, *Steindachner*.) Specimens numbered 26,758, 26,849, and 26,864, distributed by the U. S. Nat. Mus. in 1881, as *Umbrina xanti*, are all typical of *Umbrina roncador*. (See Proc. U. S. Nat. Mus., 1881, 11.)

*Umbrina roncador* closely resembles *U. xanti*, but is readily distinguished by the smaller scales (lat. l. 45 to 50 in *U. xanti*), and by the color, *U. xanti* having broader and duller stripes, without the intermediate lines of dots. The peritoneum and lining of the opercle are paler in *U. xanti* and the body is deeper and less gracefully formed.

29,379. *Albula vulpes* (L.) Goode. Pequeña Bay.
29,388. *Serranus nebulifer* (Grd.) Steind. Ascension Island.
29,375. *Harpe pulchra* (Ayres) J. & G. Ascension Island.
29,369. *Caulolatilus princeps* (Jenyns) Gill. Ascension Island.
29,365. *Scorpæna guttata* Grd. Ascension Island.
29,381. *Xenichthys californiensis* Steind. Cerros Island.
29,364, 29,352. *Harpe pulchra* (Ayres) J. & G. Guadalupe Island.

29,376. *Sebastodes auriculatus* (Girard) J. & G. San Martin Island.
29,361. *Sebastodes serriceps* J. & G. San Martin Island.
29,374. *Heterostichus rostratus* Grd. San Martin Island.
29,360. *Muræna mordax* Ayres.

INDIANA UNIVERSITY, *November* 15, 1881.

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# ON THE GENERA OF CHITONS.

## BY W. H. DALL.

### PALÆOZOIC FORMS.

The long delay in preparing the illustrations for the monograph of the *Chitonidæ* by the late Dr. Philip P. Carpenter has been the occasion of several calls from paleontologists for an abstract of the genera adopted in his revision of the fossil species. In justice to Dr. Carpenter it seems that the characteristics of the genera should be made public, the material left by him on the Palæozoic species being practically complete and ready for printing. The Mesozoic and Tertiary chitons all belong to groups represented by living species, hence the present abstract relates solely to those of earlier date. The groups of recent chitons, already reviewed by me in these Proceedings,* form the subject of the second more condensed abstract herewith.

The first fossil chiton was found by Defrance in 1802, in the Eocene, and described by Lamarck as *Chiton grignonensis*. It was only in 1834 that a second species, *C. antiquus* Conrad, was obtained, on this occasion from the Alabama Tertiary.

The first palæozoic chitons were found in the Carboniferous rocks of Tournay, in 1836, but they were not described until 1839. Since then numerous others have been brought together and described by various authors, as well as a number of organic remains not belonging to the *Chitonidæ* which have wrongly been referred to the group. Dr. Carpenter expended a large amount of time and money in examining the typical specimens in American and European museums, making several journeys for the purpose. His opinions, therefore, are entitled to great weight. Some time before his death, at his request, we went over the ground together, specimens and figures in hand, and the opinion then formed that his work is worthy of great respect, and, so far as facts are concerned, of entire confidence, has not been changed by my subsequent study of his incomplete manuscripts.

An excellent digest of the history of fossil chitons to date of publication was given by De Koninck in 1857,† which was translated for the Annals and Magazine of Natural History, of August, 1860, by W. H. Baily.

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*Vol. i, pp. 281-344, 1878.

†Bull. Acad. Roy. des Sciences de Belgique, 1857.

The characters for the groups herein described are due to Dr. Carpenter, and are given mostly in his own words. It will be observed that the groups named by others are restricted by him, by elimination of incongruous material included with the original types.

## HELMINTHOCHITON Salter.

*Helminthochiton* Salter (pars) § 1, Proc. Geol. Soc., 1846, pp. 49, 51, 52, fig. 6 (§§ 2, 3, and figs. 2, 3, exclus.).

Lorica leptoidea, elongata, regularis; mucro ischnoideus; valvæ terminales haud sinuatæ; apophyses ? (ignotæ).

*Helminthochiton* may be described as a greatly lengthened chitonous animal with the valves thin and angular, and perhaps without apophyses, though the negative evidence is not sufficient to establish so remarkable a departure from the type of the class in general. It differs from *Gryphochiton* in having the terminal valves regular, not sinuate, and in having a regular subcentral Ischnoid mucro instead of the *Gryphæa*-like beak characteristic of the second section. It may be regarded as a Leptoid *Ischnoplax* with the valves thrown forward.

### *Species.*

*Helminthochiton Griffithi* Salter, l. c., pp. 51, 52, fig. 6. Silurian of Ireland. (Type.)
*Helminthochiton priscoides*, Carpenter. Devonian of Vilmar; Schultze. (Mus. Comp. Zoölogy.)

## GRYPHOCHITON (Gray) Carpenter.

*Gryphochiton* Gray (pars.), P. Z. S., 1847, p. 70; no diagnosis.

Lorica regularis elongata; laminæ laterales nullæ, suturales parvæ, a sinu simplici lato separatæ; mucro postice medianus, incurvatus; regio capitis et caudæ valde sinuata. Type *G. priscus* Munster.

*Gryphochiton* resembles a *Leptochiton* greatly drawn out and with the terminal valves more sinuated than has been observed in any recent *Chiton.*

### *Species.*

*Gryphochiton priscus* Münster, Beitr. zur petr. kunde, 1, p. 38, fig. 4, 1839. Carboniferous of Tournay.
*Gryphochiton mempiscus* Ryckholt, Bull. Acad. Roy. des Sci. de Bruxelles, 1845, p. 48, no. 4, pl. 2, figs. 5, 6, 7, 8. Carboniferous of Tournay.
*Gryphochiton triangulatum* Carpenter, Ryckholt, l. c., pl. 2, figs. 4, 9, 10. Same locality.
*Gryphochiton nervicanus*, Ryckholt, l. c., p. 47, No. 3, pl. 1, figs. 7, 8, 9, 1845. Same locality.

## Subgenus CHONECHITON Carpenter.

Lorica leptoidea, valvæ centrales *Gryphochitoni* similes, projectæ; valva postica mucrone postico, infundibuliformi.

This bears the same relation to *Choneplax* which *Loricites* does to *Lorica, i. e.* similarity, except in the absence of laminæ of insertion. It may be described as a Leptoid *Choneplax.* In the recent shell the funnel is formed by the laminæ of insertion; as these do not exist in the leptoid section, the funnel is seen in the hollowing of the back of the valve itself.

### *Type.*

*Chonechiton* (*Chiton*) *viseticola* Ryckholt, l. c., p. 51, no. 6, pl. 3, figs. 10, 11, 1845. Carboniferous of Visé, Belgium.

## PRISCOCHITON Billings.

Leptochiton: lamina postica apicali, intus excavata.

### *Type.*

*Priscochiton canadensis* Billings, Pal. Fos. Canada, 1865, p. 394, fig. 370. Lower Silurian.

## PTEROCHITON Carpenter.

Lorica elongata, leptoidea; valvæ lateraliter excavatæ, projectæ postice acuminatæ; valva postica regularis, mucrone ischnoideo; valva antica (plerumque?) sinuata; apophyses maximæ, sinu lato. Type *C. eburonicus* Ryckholt.

### *Species.*

*Pterochiton eburonicus* Ryckholt, Bull. l. c., part ii, p. 53, no. 8; pl. 4, figs. 7, 8,* 1845. Carboniferous limestone of Visé, Belgium.

*Pterochiton legiacus* Ryckholt, Bull. l. c., p. 52, no. 7, pl. 4, figs. 5, 6, 1845; *Chiton gemmatus* (pars) Koninck, An. Fos. Carb. Belg., p. 323, no. 3, pl. 23, figs. *c, d, e* (not figs. *a, b*). Same locality as the preceding.

*Pterochiton gemmatus* (Koninck) Ryckholt, l. c., 1845, p. 59, no. 13, pl. 4, figs. 1, 2, 3 (fig. 4, forsitan exclus.). Same locality as preceding.

*Pterochiton Thomondiensis* Baily, Nat. Hist. Review and Quart. Journ. Sci., July, 1859, pl. 4, f. 2 *a–c*. Carboniferous limestone, County Limerick, Ireland.

*Pterochiton Sandbergianus* (?) Ryckholt, l. c., p. 62, 1845. Devonian, Vilmar; Schultze. (Mus. Comp. Zoöl.)

?? *Pterochiton Sluseanus* Ryckholt, l. c., p. 5, No. 10. (Non *C. Sluseanus* ejusdem, pl. 4, figs. 7, 8 = *eburonicus*.† Cf. text.)

## Subgenus LORICITES Carpenter.

Related to *Helminthochiton* and to the recent *Lorica* as above stated. From the latter it differs in the absence of laminæ of insertion. Type *Chiton concentricus* Koninck, op. cit., 1857.

## PROBOLÆUM Carpenter.

Lorica leptoidea, elongata, maxime projecta; valvis centralibus areæ centrales ante areas jugales porrectæ; valva antica sinuata, valva postica—? Type *C. corrugatum* Sandberger (pars).

Among recent forms this comes nearest to *Katherina*, but the difference is still extremely great.

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[*] The figures are wrongly named *C. Sluseanus* on the plate.

[†] Koninck does not escape this error also.

### *Type.*

*Chiton corrugatus* Sandberger fr., Verst. Rhein. Schicht. Nassau, p. 238, pl. 26, fig. 22 *a*, 1856, *not* figs. 22, 22 *b*, 22 *c*, 22 *d* = fish scales and valves of barnacles, as per typical specimens in Mus. Comp. Zoölogy, etc. Devonian of Vilmar.

## CYMATOCHITON Dall.

Valvis centralibus transversis, antice projectis, satis elevatis, jugo acutiore, lateribus planatis; apophysibus modicis, satis extantibus, valde distantibus; sinu jugali latissimo, incurrente; umbonibus extantibus, margine antico ad jugum valde postice sinuato. Type *C. Loftusianus* King.

This represents a *Leptochiton* with the valves thrown forward. It differs from *Probolæum* in the valves being transverse instead of squared, and in the terminal valves being regular instead of waved. The name *Cymatodus* used in manuscript for this group by Dr. Carpenter is preoccupied by Newberry (1870).

### *Species.*

*Cymatochiton Loftusianus* King, Annals & Mag. Nat. History, I, vol. 14, p. 382; Kirkby, Proc. Geol. Soc., 1859, p. 607, 611, 615, pl. 16, figs. 31–41. Permian, Tunstall Hill, England.

*Cymatochiton Ryckholtianus* Koninck Mss. Types Mus. Comp. Zoöl. Carboniferous of Visé, Belgium.

? *Cymatochiton tornaticola*[*] Ryckholt, l. c., p. 45, pl. 1, figs. 1, 2, 3, 1845. Carboniferous of Tournay.

? *Cymatochiton Scaldeanus*[*] Ryckholt, l. c., p. 46, pl. 1, figs. 4, 5, 6, 1845. Same locality.

? *Cymatochiton Howseanus* Kirkby, Quart. Journ. Geol. Soc. 1857, p. 216, pl. 7, figs. 9–13. Permian, Tunstall Hill, England.

This last species is the first undoubted *Chiton* to put on features common to all the recent forms of the family.

Until the full record of his investigations is published, the amount of confusion as to types, discrepancies between figures and specimens, and errors of one kind and another discovered by Dr. Carpenter in his examination of the original types of many of the species can hardly be imagined. The synonymy is also necessarily left until the complete paper shall be printed. Meanwhile the student is warned that the citations herein actually made are the only ones which are guaranteed to relate to the species named, though there may be, and in most cases are, others which might be cited. The preceding (with synonyms) number all the Palæozoic chitons actually determined to be such up to 1873.

In the course of the investigation the following species have been found not to be chitons or chitonoid. They belong variously to fish scales, barnacle (*Turrilepas*) valves, ostracod crustacea, and some to undetermined organisms.

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[*] Doubt attaches to the molluscan nature of these two minute species, which have some crustacean features.

"*Chiton*" *Grayanus* Koninck, 1857. Upper Silurian.
"*Chiton*" *Wrightianus* Koninck, ditto.
"*Chitonellus*" *Hancockianus* Kirkby, Proc. Geol. Soc., 1859, pl. 16, figs. 1-13. Permian, England.
"*Chiton*" *cordatus* Kirkby, ditto, figs. 24-29.
"*Chitonellus*" *distortus* Kirkby, ditto, figs. 28-30.
"*Chitonellus*" *antiquus* Howse, Kirkby l. c., figs. 14-23. Permian.
"*Chiton*" *cordifer* Koninck, Descr. An. Foss. Terr. Carb. Belg., 1844, p. 324, pl. 22, fig. 5 *a*, *b* (teste Ryckholt). Carboniferous of Belgium.
"*Chiton*" *corrugatus* Sandberger (pars), p. 238, pl. 26, figs. 22, 22 *b*, 22 *c*, 22 *d*, 1856. Devonian and Lower Devonian of Vilmar and Ehrenbreitstein.
"*Chiton*" *sagittalis* Sandberger, l. c., p. 239, pl. 26, figs. 23 *a*, *b*. Same locality?
*Sulcochiton Grayi* Ryckholt, Journal de Conchyl., 1862, p. 259, pl. xii, f. 14. Carboniferous of Visé, Belgium.

## ABSTRACT OF ALL THE GENERA.

## Order POLYPLACIPHORA.

### Section I.—Chitones regulares.

Head and tail plates similarly articulated.

### A. LEPTOIDEA.

Insertion plates obsolete or, if present, unslit.

(*Extinct forms.*)

1. *Helminthochiton* Salter.
2. *Gryphochiton* Gray.
    a. *Chonechiton* Cpr.
3. *Priscochiton* Billings.
4. *Pterochiton* Cpr.
    a.? *Loricites* Cpr.
5. *Proboloeum* Cpr.
6. *Cymatochiton* Dall.

(*Recent forms.*)

7. *Leptochiton* Gray.
    a. *Deshayesiella* Cpr.
8. *Hanleyia* Gray.
9. *Hemiarthrum* Cpr.
10. *Microplax* Adams and Angas.

### B. ISCHNOIDEA.

Insertion plates sharp, smooth, fissured; with eaves.

*No pores on girdle.

11. *Trachydermon* Cpr.
    a. *Trachyradsia* Cpr.
12. *Callochiton* Gray.
    a. *Stereochiton* Cpr.
13. *Tonicella* Cpr.
14. *Schizoplax* Dall.
15. *Leptoplax* Cpr.
16. *Chætopleura* Shuttleworth.
    a. *Maugerella* Cpr.
17. *Spongiochiton* Cpr.
18. *Ischnochiton* Gray.
    a. *Stenoplax* Cpr.
    b. *Stenoradsia* Cpr.
    c. *Ischnoplax* Cpr.
    d. *Heterozona* Cpr.
    e. *Ischnochiton* s. s. Cpr.
    f. *Ischnoradsia* Shuttleworth.
    g. *Lepidopleurus* Cpr.
    h. *Lepidoradsia* Cpr.
19. *Callistochiton* Cpr.

**With girdlepores.

20. *Callistoplax* Cpr.
21. *Angasia* Cpr.
22. *Newcombia* Cpr.
23. *Ceratozona* Dall.
24. *Pallochiton* Dall.

### C. LOPHYROIDEA.

Insertion plates broad, pectinated, projecting backward.

25. *Chiton* Linné.
    a. *Radsia* Gray.
26. *Tonicia* Gray.
    a. *Fannettia* Dall.
27. *Eudoxochiton* Shuttleworth.
28. *Craspedochiton* Shuttleworth.

### D. ACANTHOIDEA.

Insertion plates thrown forward.

*Plates broad, pectinated (*A. lophyroidea*).

29. *Sclerochiton* Cpr.

**Plates sharp, grooved outside (*A. typica*).

30. *Acanthopleura* Guilding.
    a. *Lucilina* Dall.
    b. *Corephium* Gray.
    c. *Francisia* Cpr.

***Plates sharp, smooth (*A. ischnoidea.*)

31. *Dinoplax* Cpr.
32. *Middendorfia* Cpr.
    a. *Beanella* Dall.
33. *Nuttallina* Cpr.
34. *Arthuria* Cpr.
35. *Phacellopleura* Guilding.

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## Section II.—Chitones irregulares.

Tail plate abnormal or with a sinus behind.

### E. SCHIZOIDEA.

Tail valve fissured.

36. *Lorica* H. and A. Adams.
    a. *Aulacochiton* (Shuttleworth) Cpr.
37. *Schizochiton* Gray.

### F. PLACIPHOROIDEA.

Tail valve unslit, internally ridged, mucro nearly terminal.

38. *Enoplochiton* Gray.
39. *Ornithochiton* Gray.
40. *Placiphora* Gray.
    a. *Fremblya* H. Adams.
    b. *Euplaciphora* Shuttleworth.
    c. *Guildingia* Cpr.

### G. MOPALOIDEA.

Tail valve with posterior sinus and one slit on each side.

41. *Mopalia* Gray.
    a. *Placiphorella* Cpr.
42. *Katherina* Gray.
43. *Acanthochiton* (Leach) Herrm.
    a. *Macandrellus* Cpr.
    b. *Stectoplax* Cpr.
44. *Notoplax* H. Adams.

### H. CRYPTOIDEA.

With double sutural laminæ.

45. *Cryptoconchus* Blainville.
46. *Amicula* Gray.
    - a. *Amicula* s. s. Dall.
    - b. *Chlamydochiton* Dall.

47. *Cryptochiton* Gray and Middendorf.

### I. CHITONELLOIDEA.

Tail plate funnel-shaped. Laminæ thrown forward.

48. *Chitonellus* Blainville.
    - a. *Cryptoplax* Gray.

49. *Choneplax* Cpr.
    - a. *Chitoniscus* Cpr.

It is hardly necessary to observe that the names here ascribed to Gray, Shuttleworth, and other older writers are more or less restricted so as to make them natural assemblages, which most of them originally were not. The subdivisions under similar names to be found in Adams' Genera of Recent Mollusca and Chénu's Manual are nearly all heterogeneous assemblages. Some names which were found to have been preoccupied in other groups have been replaced by new ones. Nearly all the names enumerated have been made public, some of them many years ago, others by Dr. Carpenter in his "Table of Regular Chitons," distributed in November, 1873, but of which a large proportion of the copies printed are still on hand. Some appeared in different papers on mollusca of the northwest coast of North America, published by Dr. Carpenter from 1863 to 1874, and several were elucidated in a paper on the New England chitons in the Bulletin of the Essex Institute in 1873. A majority of them were also characterized by me (partly from Dr. Carpenter's manuscript) in my Report on the Limpets and Chitons of Alaska, &c., Proc. U. S. National Museum, December, 1878. Such as still remained unpublished are now included in the following analytical tables with additional notes elucidating their characters more fully.

It is believed that the publication of these tables will be beneficial in several ways, as in giving a general view of Dr. Carpenter's classification, and especially in calling attention to the characters which it is desirable should be distinctly noted by those who may describe new species of *Chitonidæ*, and for the want of which it is impracticable, in the majority of cases, to properly classify or even to subsequently recognize the species. The technical terms used and the relations of the several parts have been explained in my report above mentioned, and it is not considered necessary here to repeat the explanations.

The publication of the entire monograph only awaits the preparation of the illustrations, which has been delayed by circumstances entirely beyond the writer's control.

It may be thought by some who have not investigated the subject that the group has been unduly divided. In regard to the permanent relations of its various genera, no dogmatism is justifiable at present or until the characters of a much larger number of species have been definitely determined. Until then, when the questions can be decided, the various subdivisions will at least serve a very useful purpose in calling attention to differences which otherwise might pass unnoticed or unheeded. For my own part, my impressions are that the majority of the genera or subgenera proposed by Dr. Carpenter will eventually be recognized as well founded, though a certain number may be condemned to consolidation.

### NOTES ON THE GENERA.

6. *Cymatodus* Carpenter, MS., not of Newberry, 1870.

7*a*. Differs from *Leptochiton* not only in its hairy girdle, but also in its valves, which are thrown forward, forming a decided transition toward some of the palæozoic forms. Type *Leptochiton curvatus* Cpr. Okosiri, Japan; A. Adams.

10. *Microplax* Adams and Angas 1864, not of Lilljeborg, 1865.

12. *Callochiton* (restricted). Laminæ broken up into very numerous teeth rising out of spongy eaves, and having a tendency to become propped outside; sinus a mere wave in the united bodies of the sutural laminæ; mantle reticulated with peculiar bodies, the tips of which appear like diamond-shaped scales, and which are unlike the girdle-armature of any other Chiton. Example *Chiton lævis* of Montague, Pennant and Gray.

12*a*. Subgenus *Stereochiton;* Callochiton: zona coriacea sparsim lanuginosa. Type *Chiton castaneus* Wood, Ind. Test. et Gen. Conch.

15. Valvæ tenues in zona tenui, levi, partim immersæ; laminæ insertionis acutæ, terminales pauci-fissatæ, sed regulares; sinus haud dentatus; mucro medianus. Example, *Chiton coärctatus* Sowerby, Isle of Bohol.

17. Valvæ partim immersæ; laminæ acutæ, Ischnoidæ; sinus magnus levis; mucro medius planatus; zona spongiosa, antice producta. Example, *Spongiochiton productus* Cpr., New Zealand, Mus. Cuming, no. 50. This may be considered a partially covered *Chætopleura*, just as *Leptoplax* is a partially covered *Tonicella*.

20. Testa extus et intus ut in Callistochitone, zona porifera aliter nuda. Type *Chiton retusus* Sby. China Seas.

21. Testa extus et intus Chætopleuroidea sed subgrundis parvis; zona minutæ squamulopilosa, fasciculis ad suturas instructa. (=*Hanleyia* Ad. & Angas, non Gray). Type *A. tetrica* Cpr. Ceylon. Mus. Cuming, no. 83.

*Hanleia variabilis* Ad. and Angas probably belongs to this group, but has not been dissected.

23. *Ceratophorus* Carpenter MS. (non Diesing, 1850). Valvæ extus et intus Chætopleuræ similis, sed dentibus suffultis, subgrundis curtis; zona levis, in cornua seu cornuum fasciculas circa suturas et marginem porrecta. Type *Chiton Guildingi* Reeve.

This differs from all other hairy or spiny Chitons, at all nearly related to it, in the mantle ornaments not being inserted into sockets, but being extensions of its substance.

24. (*Hemphillia* Cpr. MS., non Binney.) *Nuttallina:* zona lanugosa; laminæ centrales unifissatæ. This section unites in a form resembling *Nuttallina* some of the features of *Middendorfia*, from which the girdle differs in being spongy and covered with soft hairs instead of short shelly bristles. The shape is that of an *Ischnochiton*, the sculpture and girdle of *Chætopleura*, the insertion plates and sinus almost exactly like *Middendorfia*. Type *Pallochiton lanuginosus* Cpr. sp. Lower California.

26*a*. *Fannia* Gray, not Robineau Desvoidy, 1830.

29. Lorica Acanthopleuræ, zona Enoplochitoni similis; laminæ obtusæ, pectinatæ, sinus undatus, levis. Type *Sclerochiton* Cpr. Torres Straits. Mus. Cuming, no. 42.

Most like *Enoplochiton*, from which it differs in the articulation of the tail plate and the sub-central mucro.

30*a*. *Lucia* Gould, not of Swainson, 1833.

30*c*. Acanthopleura: valvis partim immersis, planatis; laminis centralibus pleurifissatis; sinu lobato. Type *Chiton spinosa* Brugiere.

This form bears the same relation to *Acanthopleura* that *Fannettia* does to *Tonicia*, with the additional peculiarity of Radsioid nicks in the central valves. Named for Dr. Francis, once editor of the Annals and Magazine of Natural History.

31. Lorica solidissima alata: mucro haud elevatus submedianus; laminæ valvæ separatæ, acutæ, leves; V. post. antice tendentes; sinus minimus; zona coriacea, fasciculatim spinulosa. Type *Chiton gigas* Chemnitz.

32. (*Dawsonia* Cpr. (preöc.) 1873; *Middendorfia* Cpr. in MS. later.) Lorica et zona extus ut in *Acanthopleura;* laminæ acutæ, extus rugosa, suffultæ; sinus planatus haud laminatus. Type *Chiton Polii* Philippi (non Deshayes), Dalmatia. Internally Ischnoid, externally Acanthopleuroid.

32*a*. (*Beania* Carpenter, not Johnstone.) Lorica et zona inter Acanthopleuram et Ischnochitonem intermedia; mucro submedianus; laminæ acuti, haud suffulti; zona squamis subspinosis striatis vix imbricata. Type *Chiton Rissoi* Cuming, non Payr. *C. pseudorissoi* Cpr. MS., Malta. Mus. Cuming, no. 51.

34. Lorica tenuis; valvæ undatæ; mucro posticus, productus, laminæ acutæ, leves; V. post. antice projectæ, sinus planatus, laminatus, levis; zona coriacea, levis, seu lanugata. Type *Arthuria filosa* Cpr., loc. incert. Mus. Cuming, nos. 23, 38.

This has the aspect of *Chætopleura* externally in sculpture, but has the tail plate like *Nuttallina* in its structure, and like *Placiphora* in its external appearance.

36*a*. *Aulacochiton* pars, Shuttleworth, 1853. Lorica: mucrone postico, parum sinuato; sinu lobato; zona squamulis minimis obsita, antice producta. Example, *Lorica Angasi* H. Adams, P. Z. S., 1864, p. 193. Australia.

40*a*. =*Streptochiton* Cpr. MS. Type *F. Collei* H. Adams. Australia.

40*b*. Placiphora: sinu lato, planato; zonæ setis haud fasciculatim instructis. Type *Chiton petholatus* Sowerby. South Australia.

40*c*. Placiphora: valvis partim immersis; zona postice emarginata. Type *G. obtecta* Cpr. New Zealand. Mus. Cuming, no. 45.

43*a*. *Acanthochiton:* valvis partim tectis; mucrone Ischnoideo; lam. postica rugosim lobata; ar. lat. depressis. Type *M. plumeus* Cpr. Hab.? Mus. Cuming, no. 108.

43*b*. *Acanthochiton:* valvis per duas trientes immersis. Type *S. porrecta* Cpr. Japan. Mus. Cuming, no. 97.

49. Animal repens, satis elongatum: valvæ expositæ parvæ, omnino contiguæ; valva postica infundibuliformis; mucro retrojectus, terminalis; laminæ ut in *Katherina* sed obsoletim fissatæ; zona Acanthochitonoidea. Type *Chiton strigatus* Sowerby. West Indies.

49*a*. Animal et testa Choneplacis similes sed zona haud porifera. Based on *Chitonellus striatus* and *strigatus* Sowerby, Conch. Ill., figs. 62 and 63, which are represented as without pores. In the former the valves are separated (as in *Notoplax*); in the latter they touch (as in *Choneplax*). The species need examination to confirm the accuracy of the figures, but it is probable that there are both pore-bearing and non-poriferous species among the vermiform as well as the compact Chitonelles. These last groups are the highest and most active in the whole order in tropical waters, as is *Cryptochiton* in the north.

## TABLE I.

The following table will exhibit the minor characteristics of most of the recent Chitons in regard to the plan of the insertion plates, number of slits, if any, in anterior, middle and posterior valves; character of the tooth-like projections between the slits; and of the margin of the outer layer overhanging the insertion plates, termed *eaves* by Dr. Carpenter; all according to the numbers and letters of the preceding list:

× = many; ∸ = few: + = or more: ✱ = irregular.

| No. of genus. | Plan of insertion plates. | Slits in valves. | | | Teeth. | Eaves. | Gills. |
|---|---|---|---|---|---|---|---|
| | | Posterior. | Anterior. | Middle. | | | |
| | (*Leptoidea.*) | | | | | | |
| 7 | None | 0 | 0 | 0 | None | None | Short. |
| 7*a* | ....do | 0 | 0 | 0 | None | None | Post. |
| 8 | Only in anterior valve | 0 | 0 | 0 | Rugose lamina | Minute | (?) |
| 9 | Present in anterior and posterior valves. | 0 | 0 | 0 | Smooth lamina | ....do | Short. |
| 10 | Present in all valves | 0 | 0 | 0 | ....do | None | Short. |
| | (*Ischnoidea.*) | | | | | | |
| 11 | Regular, branching | × | × | 1 | Sharp, normal | Projecting, spongy. | Med. |
| 11*a* | ......do | × | × | 2+ | ....do | ....do | Med. |
| 12 | Minutely divided | × | × | 2+ | Propped outside | Broad, spongy | (?) |
| 12*a* | ......do | × | × | 5+ | ... do | ....do | (?) |
| 13 | Regular, branching | × | × | 1 | Sharp, normal | Short | Med. |
| 14 | ......do | 11 | 11 | 1 | ....do | ....do | Subamb. |
| 15 | Regular, projecting | 6 | 4 | 1 | Sharp, long, thin | Minute | (?) |
| 16 | Regular, branching | × | × | 1 | Sharp, normal | Moderate | Amb. |

× = many; ∔ = few; + = or more; ∗ = irregular.

| No. of genus. | Plan of insertion plates. | Slits in valve. | | | Teeth. | Eaves. | Gills. |
|---|---|---|---|---|---|---|---|
| | | Posterior. | Anterior | Middle. | | | |
| 16*a* | Regular, branching | × | × | 2+ | Sharp, normal | Projecting | (?) |
| 17 | do | 6 | 5 | 1 | Sharp, long, smooth. | Minute | (?) |
| 18*a* | do | × | × | 1 | Sharp, normal | Projecting | Amb. |
| 18*b* | do | × | × | 2+ | do | do | Amb. |
| 18*c* | do | 8 | 10 | 1 | do | do | Amb. |
| 18*d* | do | 11 | 11 | 1 | do | do | Amb. |
| 18*e* | do | × | × | 1 | do | do | Amb. |
| 18*f* | do | × | × | 2+ | do | Projecting, long | Amb. |
| 18*g* | do | × | × | 1 | do | do | Amb. |
| 18*h* | do | × | × | 2+ | do | do | Amb. |
| 19 | do | × | × | 1 | Excurved, plumate | do | Amb. |
| 20 | do | × | × | 1 | Excurved, solid | Projecting | (?) |
| 21 | do | × | 5 | 1 | Rough, propped | Short | (?) |
| 22 | do | × | × | 1 | Solid, not propped | do | (?) |
| 23 | do | × | × | 1 | Solid, propped | do | (?) |
| 24 | do | 8–10 | 8–9 | 1 | Sharp, curved | Short, spongy | Med. |
| | (*Lophyroidea.*) | | | | | | |
| 25 | Regular, branching | × | × | 1 | Blunt, serrate | Short, spongy | Amb. |
| 25*a* | do | × | × | 2+ | do | do | Amb. |
| 26 | do | × | × | 1 | Sharper, serrate | do | Amb. |
| 26*a* | do | 9 | 9 | 1 | Sharper, serrate, long | Very short | Amb. |
| 27 | Unfissured | ∗ | ∗ | ∗ | Blunt, fimbriate | Short | (?) |
| 28 | Regular | 8 | 5 | 1 | (?) | (?) | (?) |
| | (*Acanthoidea.*) | | | | | | |
| 29 | Regular, branching | × | × | 1 | Blunt, grooved | Projecting, grooved. | (?) |
| 30 | do | × | × | 1 | Longer, grooved | do | Amb. |
| 30*a* | do | × | × | 2+ | do | do | (?) |
| 30*b* | do | 0 | × | 1 | do | do | Amb. |
| 30*c* | do | 10 | 15 | 2+ | do | Very short | (?) |
| 31 | do | 10 | 10 | 1 | Long, smooth | Moderate, not grooved. | (?) |
| 32 | do | 8 | 9 | 1 | Propped, smooth | Moderate, spongy | (?) |
| 32*a* | do | 9 | 9 | 1 | Short, sharp, smooth. | Projecting | (?) |
| 33 | V. all thrown forward | 7–8 | 10 | 2 | Very long, sharp, smooth. | Short | Amb. |
| 34 | V. post. thrown forward | 9+ | 10 | 1 | Normal, sharp, smooth. | Moderate | (?) |
| 35 | do | 6+ | 5 | 1 | Very long, sharp, smooth. | Very short | Amb. |
| | (*Schizoidea.*) | | | | | | |
| 36 | Regular, posterior valve slit between 2 ridges. | 0 | × | 1 | Blunt, rugose | Moderate | (?) |
| 36*a* | | 0 | × | 1 | Sharp, serrate | Long | (?) |
| 37 | Str. forward, deep slit | ∔ | × | 1–2 | Sharp, long | Small | Med. |
| | (*Placiphoroidea.*) | | | | | | |
| 38 | Str. forward, flat behind | 0 | × | 1 | None behind | Deeply furrowed | (?) |
| 39 | Regular, flat behind | 0 | × | 1 | Normal, serrate | Moderate | (?) |
| 40 | Regular, ribbed behind | 0 | × | 1 | Slightly propped | Small | Amb. |
| 40*a* | do | 0 | × | 1 | Excurved | do | (?) |
| 40*b* | do | 0 | × | 1 | Sharp | Minute | (?) |
| 40*c* | do | 0 | × | 1 | Sharp, very long, smooth. | do | (?) |
| | (*Mopaloidea.*) | | | | | | |
| 41 | Regular, posterior valve laminated. | 1 | 8+ | 1 | Long, propped | Minute | Med. |
| 41*a* | | 1 | × | 1 | Mod., simple | Small | (?) |
| 42 | Thrown forward, laminated | ∗ | 7 | 1 | Very long, propped | Minute, spongy | Amb. |
| 43 | do | 1 | 5 | 1 | Long, sharp, smooth | Small | Med. |
| 43*a* | Thrown forward somewhat. | ∗ | 5 | 1 | Very long, sharp, smooth. | Minute | (?) |
| 43*b* | Thrown forward much | 1 | 5 | 1 | Very long, sharp, rugose. | do | (?) |
| 44 | Tail plate crenate behind | 2 | 5 | 1 | Crenate, sharp, smooth. | do | Long. |
| | (*Cryptoidea.*) | | | | | | |
| 45 | Regular, behind variable | ∗ | 5 | 1 | Very long, smooth | Minute | †. |
| 46*a* | Mopaloid | 2 | 6 | 1 | do | do | Med. |
| 45*b* | do | 2 | 5 | 1 | do | do | Amb. |
| 47 | Coarsely mopaloid | 2 | 5 | 1 | do | None | Amb. |
| | (*Chitonelloidea.*) | | | | | | |
| 48 | Very sagittate | 0 | 5 | 0–1 | Very short, except at sutures | Distinct | Post. |
| 48*a* | do | 0 | 5 | 0 | | do | Post. |
| 49 | Intermediate | 1 | 5 | 1 | Mod. long in front | Minute | (?) |

## TABLE II.

This table enumerates in brief the characters of the sinus of the girdle and its armature, and the chief distinctive peculiarities of each group.

| No. of genus. | Sinus. | Girdle. | Peculiarities. |
|---|---|---|---|
| 7 | Simple, smooth, deep | Gravelly scales, smooth or striated | All negative. |
| 7*a* | Simple, broad | Spicules and chaffy scales | Flattened mucro, valves thrown forward. |
| 8 | Simple, broad, shallow | With hairs or fine spines | Laminæ only on anterior valve. |
| 9 | Broad, spongy | Solid, downy, poriferous | Terminal valves laminated. |
| 10 | Obsolete | Thin, horny, finely granulous | Unslit laminæ on all valves. |
| 11 | Broad, shallow | Granular flattish scales | Short gills, granular scales. |
| 11*a* | do | do | Radsioid central slits. |
| 12 | Extremely small | Long, horny scales | Small sinus, reticulate girdle, crowded propped teeth. |
| 12*a* | Most minute | Smooth, downy | Smooth girdle. |
| 13 | Broad, shallow | Smooth or downy | Short gills, ischnoid plates. |
| 14 | Broad, fissured | Smooth | Valves slit in dorsal axis. |
| 15 | Moderate | Thin, smooth | Teeth few, valves partly immersed. |
| 16 | Broad or minute | Hairy | Ischnoid plates, hairy girdle. |
| 16*a* | Broad, smooth | Short, striated, shelly bristles | Radsioid slits ischnoid plates, striated bristles. |
| 17 | Simple, broad, deep | Spongy, downy | Half immersed valves, plates ischnoid. |
| 18*a* | do | Irregular, chaffy scales | Body long, chaffy scales. |
| 18*b* | do | do | Same as last, with radsioid slits. |
| 18*c* | Simple, narrow, deep | Long, striated spines and scales | Same, triple series of striated scales. |
| 18*d* | Simple, broad, shallow | Double series scales, not chaffy | Body normal, double series of scales. |
| 18*e* | do | Small, transverse scales | Body normal, small striate scales. |
| 18*f* | do | do | Body normal, radsioid slits. |
| 18*g* | Broad, shallow, sometimes dentate. | Large, smooth, imbricated scales. | Scales of *Chiton*, plates of *Ischnochiton*. |
| 18*h* | | | Same, with radsioid slits. |
| 19 | Broad, shallow, laminate | Narrow, with small scales | Narrow girdle, highly sculptured, plates curved outward. |
| 20 | Narrow, deep, laminate | Smooth, with marginal tufts | Curved plates, marginal pores. |
| 21 | Narrow, shallow, simple | Minute bristles and sutural hair-tufts. | Propped teeth, sutural pores. |
| 22 | Rounded, simple | Fleshy with long, hairy bristles. | Tough, fleshy girdle, propped teeth. |
| 23 | Narrow, shallow, simple | Smooth, with horny processes | Propped teeth, horny girdle processes. |
| 24 | Broad, shallow, simple | Spongy, with scattered soft hairs. | Spongy girdle, single lateral slits. |
| 25 | Squared, denticulate | Large, solid, imbricate scales | Broad serrated teeth and sinus, scaly girdle. |
| 25*a* | do | do | Same, with added side slits. |
| 26 | do | Smooth or downy | Sharper teeth, smooth girdle. |
| 26*a* | do | Smooth, spreading | Sharper teeth, valves partly covered. |
| 27 | Small, laminæ united | Hairy | Non-fissured but deeply pectinate teeth, hairy girdle. |
| 28 | (?) | "Minutissime asperulus" | Posterior valve "medio fimbriata." |
| 29 | Large, laminæ united | Large, solid, grooved scales | Non-imbricate scales, broad grooved and serrate teeth. |
| 30 | Large, waved, laminæ united. | Shelly bristles | Teeth short inside, long outside, waved sinus. |
| 30*a* | (?) | do | Same, with radsioid slits. |
| 30*b* | Large, waved, lobed, laminæ united. | Shelly spines | Spinous girdle, lobed sinus. |
| 30*c* | | Shelly bristles, spreading | Partly covered valves, radsioid slits. |
| 31 | Minute, waved, smooth | Smooth, small, downy tufts | Downy girdle tufts, smooth sharp teeth. |
| 32 | Simple, laminæ separated. | Granular bristles | Bristly girdle, smooth propped teeth. |
| 32*a* | do | Bristly, striated scales | Sharp teeth, striate scales. |
| 33 | do | Broad, with shelly bristles | Long, sharp teeth, radsioid slits, posterior mucro. |
| 34 | Narrow, smooth, laminate. | Thin, lanugate | Twisted mucro, smooth, thin girdle, thin ischnoid valves. |
| 35 | Narrow, laminæ separated. | Thin, lanugate, wide, with sutural pores. | Smooth, porous girdle partly covering valves, very long teeth. |
| 36 | Narrow | Slit behind, solid smooth scales | Slit tail-plate, scaly girdle. |
| 36*a* | Narrow, lobed | Produced in front, upright scales. | Sharp teeth, produced girdle, bilobed scales, lobed sinus. |
| 37 | Narrow, very deep | Slit behind, minute spiculæ | Very long and narrow, deep slit. |
| 38 | Deep, lobed | Large, separate scales, bristles between. | Scaly girdle, flattened tail-plate. |

TABLE II—Continued.

| No. of genus. | Sinus. | Girdle. | Peculiarities. |
|---|---|---|---|
| 39 | Moderate, lobed | Chaffy hairs | Hairy girdle, glossy valves, flattened tail-plate. |
| 40 | Small, sut. laminæ joined | Hairy, with regular pore-tufts | Rows of pore tufts, swollen ribs. |
| 40*a* | Broad, shallow | do | Outbending of the teeth. |
| 40*b* | Broad, deep, spongy | Crowded hairs without pores | Hairy girdle without pores. |
| 40*c* | do | Encroaching on valves, pore-tufts | Valves partly covered. |
| 41 | Very narrow | Hairy, often slit behind | Normal shape, sharp laminæ with one slit, waved behind. |
| 41*a* | do | Regular pores, much produced in front. | Same, with small pores. |
| 42 | Deep, broad, spongy | Smooth, valves nearly covered | Smooth, broad girdle, teeth thrown forward. |
| 43 | do | Hairy, with long, fasciculated spiculæ. | Tufted girdle, large laminæ, minute tail-plate. |
| 43*a* | Moderate | Smoother, with tufts | Valves partly covered, sunken side areas, lobed tail-plate. |
| 43*b* | Shallow, broad | Hairy, with tufts | Valves nearly covered, tufted girdle. |
| 44 | Deep, narrow | Crowded spicules, with sutural pores. | Valves separated with narrow sinus. |
| 45 | Deep, arched | Smooth, tufted, valves nearly covered. | Arched, nearly covered valves, tubercular pores near jugum. |
| 46*a* | Broad | Smooth, irregularly tufted | Tips of valves only exposed, soft bristles irregularly disposed, short gills. |
| 46*b* | do | Coriaceous, irregularly tufted | Same, with ambient gills. |
| 47 | Deep | Covering the shell, with numerous fine spiculæ in tufts all over the surface. | Valves entirely covered. |
| 48 | Very deep and narrow | Crowded bristles, no tufts | Very long, hind valves separate. |
| 48*a* | do | Crowded bristles, with tufts | Same, with small tufts. |
| 49 | do | Gravelly, with sutural tufts | Side tufts, valves touching. |

With the above data and those comprised in my report on the Limpets and Chitons of Alaska, &c., students should be pretty well able to refer any Chiton of whose characters they have made themselves masters to its proper place in the general classification.

NOVEMBER 30, 1881.

# NOTES ON CERTAIN ABORIGINAL SHELL MOUNDS ON THE COAST OF NEW BRUNSWICK AND OF NEW ENGLAND.

### BY S. F. BAIRD.

During several successive visits made to New England and the Provinces, I embraced the opportunity of examining a number of interesting shell mounds, intending to continue the research and to prepare a detailed account of them. Subsequent events, however, have prevented my doing this, and I now publish some fragmentary notes on the subject, for the purpose of calling attention to the localities and inviting further examination.

In general, it is possible to determine beforehand the existence of shell heaps by the physical surroundings. Thus, whenever on the sea-coast the shore sloped gently to the south, with fresh water in the neighborhood, shell mounds or beds could always be inferred, especially if in the vicinity of flats where clams could be obtained. Here were generally established the sites of villages or of temporary encampments.

Prof. F. W. Putnam, in one of his papers upon shell mounds in New England, has remarked upon the comparative absence of stone implements therein. This I did not find to be the case in Maine and New Brunswick; indeed, in some cases, the abundance was quite remarkable.

The examinations of the shell beds in New Brunswick and Eastern Maine were mostly made in the summer of 1869; of those on Cape Cod, in 1870 and 1871; and of those on Casco Bay, in 1873. All the specimens collected are in the National Museum at Washington.

No. 1.—*Oak Bay, St. Croix River, St. David's Parish, New Brunswick.*—This locality is on the eastern side of Oak Bay, and is about eight miles from Calais, on the farm of Josiah Simpson. This is the most extensive and in fact one of the richest mounds I have ever examined. The total thickness of the bed is about 5 feet, and the different layers occur in a succession indicated in the accompanying diagram.

A striking feature in this mound is the abundance of spines and shells of Echini, which evidently constituted a large portion of the food of the aborigines. A careful examination of the ashes indicated that they were derived, for the most part, from eel-grass (*Zostera marina*), and it is suggested that the cooking of the shells was done by wrapping them up in dry eel-grass and setting fire to it. This would probably cook the animals sufficiently to enable them to be readily withdrawn from the shell.

Oak Bay is a narrow fjord, extending northward from Passamaquoddy Bay, the water being entirely salt. The tides are very high, and a vast extent of flats is exposed at low water, still abounding in the soft clam.

The area of the shell bed appears to be about one acre. The principal shells are the following:

| | |
|---|---|
| *Buccinum plicosum.* | *Mya arenaria.* |
| *Natica heros.* | *Mytilus.* |
| *Pecten tenuicostatum.* | *Helix alternata.* |
| *Pecten cardium* | |

VERTICAL SECTION OF SHELL HEAP, OAK BAY, NEW BRUNSWICK, SEPTEMBER, 1869.

[Scale $\frac{1}{10}$.]

| | | |
|---|---|---|
| 6 in. | Top sod, fine powdery humus. | 1. |
| 6 in. | Much decomposed clam shells. | 2. |
| 3 in. | Fine flat gravel—Ancient beach. | 3. |
| 3 in. | Finely comminuted shells: carbonaceous matter. | 4. |
| 3 in. | Clayey humus, nearly pure. | 5. |
| 4 in. | Fine shells, white ashes, carbonaceous matter. | 6. |
| 4 in. | Finely comminuted shells, carbonaceous matter. | 7. |
| 6 in. | Shells. | 8. |
| 2 in. | Layer of *Echinus* spines. | 9. |
| 3 in. | Black bed. | 10. |
| 8 in. | Shells. | 11 |
| 3 in. | Blackish matter. | 12. |
| | Original clay. | 13. |

Several visits were made to Oak Bay in company with George A. Boardman and Dr. Todd, of St. Stephen's, New Brunswick.

No. 2.—*Cobscook Bay, Washington County, Maine; Farm of Levi Hallowell.*—This point was reached by water from Eastport, Me., and is five miles south of Denysville. It is on a narrow, sloping point, running sharply into the bay and cut away at the water's edge. The surface is about 6 feet above the level of high tide. The edge has been much worn away by the water, and probably at one time extended considerably beyond its present position. The shells were much broken in the beds. The abundance of roots of trees rendered digging very difficult. The shells formed a layer of from 6 to 20 inches below the surface of the sod. Bones were very abundant, especially those of the moose and beaver. Stone arrows and flint flakes, &c., were also very numerous. The area of the bed is about 30 feet by 20, and gives rise to a decided swell in the slope. At other points in the neighborhood there are thin seams of shells in the sod, much mixed with charcoal and black earth, without any bones. I made several visits to this locality, and a more extended exploration was made by Mr. Gardiner, of Eastport, who presented his collections to the National Museum.

No. 3.—*Cobscook Bay, Washington County, Maine; South Bay, at the southern end of Long Island.*—This bed is at some distance from the water and was not very productive. It is situated on a high bank, sloping gradually to the water, and terminating abruptly. Much of it has been washed away. There appears to have been one continuous layer, covering about 30 or 40 feet by 20 with outlying hummocks. The sod is five or six inches thick, succeeded by a bed of large unbroken shells, with little or no dirt within eight or ten inches of the top. A few stone arrows were obtained here, but not many bones—none to warrant further exploration.

No. 4.—*Grand Menan, New Brunswick; Grand Harbor.*—Grand Menan is situated about 20 miles from Eastport. This was found to contain many deposits of small shell heaps; no beds, however, were very extensive. Those at Newton's Point and Ingall's Head, in Grand Harbor, were found to be the most productive localities.

The shells were much broken and mixed with dirt. Where the bed reached the water's edge it was about 40 feet wide and 10 inches thick. The only mammals observed were seals, some beaver, many bones of birds and a few of fishes were obtained. Stone articles were abundant; many arrows, flint flakes, &c. A few worked bones of the beaver were secured.

No. 5.—*Grand Menan; Nantucket Island.*—This is the residence of Simeon L. Cheney, the well-known naturalist of Grand Menan, whose assistance to many American naturalists has been so often gratefully acknowledged.

No. 6.—*Grand Menan, Cheney Island, near Whitehead Island.*—The shells in the last two localities occur on the south side of the island in detached heaps or hummocks, containing each from half a bushel to three or four bushels, not connected by any layers. They are usually high up in the field and covered with thick sod. These heaps show very few bones, and very seldom any stone implements. They appear to have been casual in their origin, and do not mark long continued settlements.

Cormorant bones were found quite abundantly in the Nantucket Island heaps. There appeared to be an unusual scarcity of bones of fishes in the Grand Menan deposits, and those chiefly of small fishes, such as sculpins, and the like. Bones of codfish, and perhaps even of goose-fish, and other large fish were more common at Eagle Hill, Ipswich, where the mounds, while abounding in the bones of fish, furnished very few of mammals and birds.

No. 7.—*Pope Logan, Lepreau Bay.*—The locality visited is on Holland's farm, on the north part of the island and west of the westernmost saw-mill. Of the numerous deposits in the vicinity only one was examined; this revealed an abundance of shells of the soft clam (*Mya arenaria*), still found in numbers in the neighborhood, the locality being celebrated all along the coast in this respect.

The shell heap examined is on a sloping bank descending to the south, the lower end being about 10 feet above high tide, and occupying an area of 150 feet by 50, and having a depth of 20 feet in the several layers. The shells were, for the most part, entire and unstratified, with very little mixture of earth. The bones of large mammals, such as the moose, and probably the caribou, were extremely abundant, occurring by the cart-load. They were much less broken up than usual.

No. 8.—*Bliss's Island, New Brunswick.*—This locality is situated near the head of the bay on the right hand of Pentlow's Cove, to the southwest. Here the shells occur in thin, compact layers on the bank facing the northwest, much mixed with black dust. The deposit is scanty and scarcely worth working.

No. 9.—*Bliss's Island, Fisherman's Cove, New Brunswick.*—This locality is on the northeast side and north of the weirs. Here the shells occur unstratified in a bed about 20 inches thick, almost free from mixture, and covered with a light, loose soil, 6 to 10 inches deep. Very few bones were found.

No. 10.—*Frye's or Cailiff's Island, New Brunswick.*—This bed was one of the richest I have ever examined. It is situated on English Cove, directly opposite Bliss's Island, to the east of Long Point. It is near the farm buildings, between two willows. Here the shell bed was a very large one, about 15 feet above the present high tide, and seems to have been torn up by the tide and restratified by the water, so that articles of the same kind and specific gravity were usually found in association. The layers consisted of black beach gravel, alternating with nearly pure gravel. The total bed was from 20 to 30 inches thick, the productive layers occupying only a few inches of it. The shells had been cast in strata on either side of a ravine or gulch, along the bottom of which there were but few shells, but containing nearly all the bones and stone implements of the original bed mixed with gravel. West of this locality is another bed at a lower level than the first.

I am much indebted to Mr. Henry Frye, of St. George, New Brunswick, for permission to examine this locality, the scientific interest of which he appears fully to appreciate.

No. 10A.—*East side of Digidequash River, Passamaquoddy Bay, New Brunswick.*—Not very productive.

No. 10B.—*Roque's Island, Maine.*—This is on the southern side of an island bordering on Roque's Island thoroughfare, which separates Roque's Island from Spruce Island, and situated between Machias and Quoddy Head. The bed here was 3 feet thick, with old loam above it nearly a foot thick, the whole extending nearly a mile. This locality was not visited by myself, but reported by Lieut. J. A. Slocum, of the revenue-cutter Mosswood.

No. 11.—*Green Point along Letite, Passamaquoddy Bay, Maine.*—Not examined.

No. 12.—*Seely's Cove.*—Not examined.

No. 13.—*Bocabec, Passamaquoddy Bay.*—Not examined.

No. 13*a*.—*Damariscotta, Me.*—The shells of this well-known locality consist almost entirely of oysters, the beds covering many acres in extent to a depth of from 5 to 15 or 20 feet. The oysters were all very large and usually narrow or slipper-shaped. Very few are now found living in the vicinity. The number of worked bones of animals or of stone implements, mixed with the shells, is extremely small; a long search of perhaps an hour will sometimes be necessary before anything of the kind can be detected.

No. 13*b*.—*Bocabec.*—Not examined.

These constitute the principal localities examined in Eastern Maine and New Brunswick. As already stated, they are characterized in some cases by large beds of shells of the soft clam (*Mya arenaria*), never of the quahaug or *Venus mercenaria*, with a little admixture of earth; in others the shells are in a much decomposed condition, with black earth scattered among them; again, by the association of large bones, especially of the moose and caribou, with but little mixture of anything else. Occasionally these beds alternated with pure shell or pure bone, possibly the shells being aggregated in summer and the bones of mammals in winter. Everywhere the bones of the great auk were found, as also those of the beaver. The only other localities examined in Maine were some islands in Casco Bay, where the bones of the great auk were unusually abundant.

No. 13B.—*Nantasket Beach, Boston Harbor.*—At various points in the vicinity of this beach are found numerous seams and hillocks of shells, consisting, however, almost entirely of *Mactra solidissima*, or horse-clams; neither *Mya* nor *Venus* were observed. The deposits are small and situated in the sand. The principal locality examined was near Skull Head.

No. 13C.—*Eagle Hill, near Ipswich, Mass.*—This locality is widely known from the investigations made therein by Messrs. Morse, Putnam, and other Massachusetts specialists.

The aboriginal shell beds are very extensive, and consist very largely of shells of the *Mya*, or soft clam. The number of stone implements and of worked bone is, however, extremely small, much less than in the shell heaps of Maine and New Brunswick.

No locality on the coast perhaps furnishes so many fresh clams for commercial purposes as the vicinity of Ipswich, ploughs being used for turning them up. They are obtained by the thousands of barrels for bait for codfish, and the refuse shells constitute masses of enormous magnitude.

No. 14.—*Nonamesset Island, near Naushon, Buzzard's Bay.*—This locality is in the inner Hadley's Harbor, on Nick's Neck, the property of Mr. John M. Forbes, and nearly opposite to Wood's Holl, Mass. The heap is very extensive, covering quite an area of the beach, and abounds in bones of the deer. The shells are principally soft clams (*Mya*), with a few quahaugs and pectens. The stone implements are extremely scarce.

No. 15.—*Great Harbor, Wood's Holl, Mass.*—Quite an interesting locality exists on Long Neck, to the west of the guano factory. The deposit covers about one hundred square yards to a depth of a foot. The shells consist almost entirely of *Crepidula plana.* Bones were very scanty, and quite a notable proportion of these were of birds. Very few stone implements were found.

No. 16.—*Parker's Point, Wood's Holl.*—On the east side of Parker's Point, opposite the low, depressed portion, is quite an extensive bed of almost entire clam-shells, the quahaug, or hard clam (*Venus mercenaria*), and but little broken. The locality covers about two hundred square yards, to a depth of about two feet. No implements or bones of any kind were ever found in this locality.

No. 17.—*Quisset Harbor, on Buzzard's Bay, north of Wood's Holl.*—Here the heaps consisted entirely of shells of the quahaug. No bones nor implements of any kind were found.

No. 18.—*Cataumet Harbor, North Falmouth, Buzzard's Bay.*—Here is a very large deposit of quahaug shells, on a point in Squeteague Pond; but no bones or implements.

No. 19.—*Mud Cove, back of Toby Island, north end of Buzzard's Bay.*—Here, as in the three preceding localities, the deposit consisted also of shells, without any bones or implements.

I have already referred to the abundance of bones of the great auk in the shell heaps of New Brunswick and Maine. They also occur in considerable numbers at Eagle Hill, near Ipswich. I do not remember to have found any myself on Cape Cod, but am under the impression that Professor Wyman reports them as discovered by him at Cotuit, on Vineyard Sound. There is certainly a great scarcity of stone implements in the shell heaps of Southern Massachusetts, compared with what we find farther north.

All the collections made by me at the localities mentioned in the present paper are now in the National Museum.

## LIST OF MARINE INVERTEBRATES, MAINLY FROM THE NEW ENGLAND COAST, DISTRIBUTED BY THE UNITED STATES NATIONAL MUSEUM.

### SERIES II.

PREPARED BY RICHARD RATHBUN.

The species enumerated in the present list were collected by the U. S. Fish Commission, mainly during the past four years, and represent a portion of the duplicate material resulting from their sea-coast explorations, and now available for distribution. Several of the species included in these duplicate sets are recent additions to science, obtained by the U. S. Fish Commission steamer Fish Hawk, from the inner edge of the Gulf Stream Slope, south of Martha's Vineyard, during the summers of 1880 and 1881. This region, which was first explored in 1880, has proved to be the richest dredging ground yet discovered upon our coast, both as regards variety of life and abundance of specimens.

Nearly all the species enumerated are included in each set, but of a few species only enough duplicates were secured to supply a portion of the sets. In the printed list to accompany each set sent out, the species omitted from that set will be erased. Except where otherwise indicated, the specimens are all preserved in alcohol. The sets will number about one hundred. The crustacea have been identified, for the most part, by Prof. S. I. Smith, and most of the other species by Prof. A. E. Verrill. The names are mainly those used in the Preliminary Check-list of the Marine Invertebrata of the Atlantic Coast, by A. E. Verrill, edition of 1879. A considerable number of species that have since been described are, however, here included.

WASHINGTON, D. C., *November*, 1881.

## CRUSTACEA.

### DECAPODA.

1. **Gelasimus pugnax** Smith.
U. S. F. C.—Narragansett Bay, R. I., shore.

2. **Platyonichus ocellatus** Latr.
U. S. F. C.—Vineyard Sound, Mass., shore.

3. **Platyonichus ocellatus** Latr. Young.
U. S. F. C.—Narragansett Bay, R. I.

4. **Carcinus mænas** Leach.
U. S. F. C.—Newport, R. I., shore.

5. **Panopeus Sayi** Smith.
U. S. F. C.—Vineyard Sound, Mass., shore.

6. **Cancer irroratus** Say.
U. S. F. C.—Narragansett Bay, R. I.

7. **Cancer irroratus** Say.
U. S. F. C.—Vineyard Sound, Mass.

8. **Cancer irroratus** Say. Young.
U. S. F. C.—Narragansett Bay, R. I.

9. **Hyas coarctatus** Leach.
U. S. F. C.—Gulf of Maine.

10. **Hyas coarctatus** Leach.
U. S. F. C.—George's Bank, 45 fath.

11. **Hyas coarctatus** Leach.
U. S. F. C.—Le Have Bank, 45 fath.

12. **Libinia emarginata** Leach.
U. S. F. C.—Narragansett Bay, R. I.

13. **Euprognatha rastellifera** Stimp.
U. S. F. C.—74 miles S. of Nantucket Island, 76 fath.

14. **Hippa talpoida** Say.
U. S. F. C.—Wood's Holl, Mass., shore.

15. **Eupagurus pollicaris** Stimp.
U. S. F. C.—Vineyard Sound, Mass.

16. **Eupagurus pollicaris** Stimp.
U. S. F. C.—Narragansett Bay, R. I.

17. **Eupagurus longicarpus** Stimp.
U. S. F. C.—Narragansett Bay, R. I.

18. **Parapagurus pilosimanus** Smith.
U. S. F. C.—87 miles S. of Martha's Vineyard, 312 fath.

19. **Munida,** Sp.
U. S. F. C.—73 miles S. of Martha's Vineyard, 65 fath.

20. **Homarus americanus** Edwards.
U. S. F. C.—Southern coast of New England.

21. **Crangon vulgaris** Fabr.
U. S. F. C.—Vineyard Sound, Mass.

22. **Pontophilus brevirostris** Smith.
U. S. F. C.—73 miles S. of Martha's Vineyard, 65 fath.

23. **Pandalus leptocerus** Smith.
U. S. F. C.—60 miles S. of Martha's Vineyard, 45 fath.

24. **Palæmonetes vulgaris** Stimp.
U. S. F. C.—Narragansett Bay, R. I., shore.

### SCHIZOPODA.

25. **Mysis americana** Smith.
U. S. F. C.—Vineyard Sound, Mass.

26. **Thysanopoda norvegica** M. Sars.
U. S. F. C.—Bay of Fundy, surface.

### AMPHIPODA.

27. **Orchestia agilis** Smith.
U. S. F. C.—Newport, R. I., shore.

28. **Talorchestia longicornis** Smith.
U. S. F. C.—New Haven, Conn., shore.

29. **Gammarus natator** Smith.
U. S. F. C.—Wood's Holl, Mass.

30. **Ptilocheirus pinguis** Stimp.
U. S. F. C.—Long I. Sd., off Noank, Conn.

31. **Unciola irrorata** Say.
U. S. F. C.—Off Newport, R. I.

32. **Themisto bispinosa** Bœck.
U. S. F. C.—87 miles S. of Block Island, R. I., 335 fath. (Stomach of Hake.)

### ISOPODA.

33. **Idotea robusta** Kröyer.
U. S. F. C.—Off Block Island, R. I., surface.

34. **Ligia oceanica** Fabr.
U. S. F. C.—Newport, R. I., shore.

35. **Æga psora** Kröyer.
U. S. F. C.—Off Nova Scotia, on cod and halibut.

### ENTOMOSTRACA.

36. **Artemia gracilis** Verrill.
U. S. F. C.—New Haven, Conn., salt vats.

37. **Temora longicornis** Müller.
U. S. F. C.—Block Island Sound, surface.

### CIRRIPEDIA.

38. **Lepas fascicularis** Ellis and Sol.
U. S. F. C.—Vineyard Sound, Mass., surface.

39. **Lepas anatifera** Linn.
U. S. F. C.—100 miles off Martha's Vineyard, surface.

40. **Balanus balanoides** Stimp.
U. S. F. C.—New Haven, Conn., shore.

41. **Balanus porcatus** Costa.
U. S. F. C.—Off Chatham, Mass., 16 fath.

42. **Balanus Hameri** Darwin.
U. S. F. C.—Off Chatham, Mass., 16 fath.

## MEROSTOMATA.

43. **Limulus Polyphemus** Latr. Dry.
U. S. F. C.—Southern New England, shore.

## ANNELIDA.

### CHÆTOPODA.

44. **Aphrodita aculeata** Linné.
U. S. F. C.—Off Martha's Vineyard, 150 to 216 fath.

45. **Lætmatonice armata** Verrill.
U. S. F. C.—Off Martha's Vineyard, 140 to 400 fath.

46. **Lepidonotus squamatus** Leach.
U. S. F. C.—Eastport, Me.

47. **Lepidonotus squamatus** Leach.
U. S. F. C.—Vineyard Sound, Mass., 8 to 12 fath.

48. **Harmothoë imbricata** Malmgren.
U. S. F. C.—Eastport, Me.

49. **Nephthys incisa** Mgn.
U. S. F. C.—Off Newport, R. I., 12 to 40 fath.

50. **Nephthys incisa** Mgn.
U. S. F. C.—Off Cape Cod, 10 to 50 fath.

51. **Nephthys cæca** Johnst.
U. S. F. C.—Cape Ann, Mass., shore.

52. **Nereis virens** Malmgren.
U. S. F. C.—New Haven, Conn., shore.

53. **Nereis pelagica** Linné.
U. S. F. C.—Vineyard Sound, Mass.

54. **Nereis pelagica** Linné.
U. S. F. C.—Off Chatham, Mass., 15 to 40 fath.

55. **Hyalinœcia artifex** Verrill.
U. S. F. C.—90 miles S. of Martha's Vineyard, 160 to 388 fath.

56. **Hyalinœcia artifex** Verrill.
U. S. F. C.—78 miles S. of Martha's Vineyard, 192 fath.

57. **Hyalinœcia artifex** Verrill. Dry.
U. S. F. C.—Off Martha's Vineyard, 160 to 388 fath.

58. **Euglycera dibranchiata** Ver.
U. S. F. C.—Newport, R. I., shore.

59. **Clymenella torquata** Verrill.
U. S. F. C.—Newport, R. I., shore.

60. **Cirratulus grandis** Verrill.
U. S. F. C.—Naushon Island, Mass., shore.

61. **Trophonia affinis** Verrill.
U. S. F. C.—Off Newport, R. I.

62. **Sternaspis fossor** Stimp.
U. S. F. C.—Off Martha's Vineyard, 20 to 100 fath.

63. **Amphitrite ornata** Verrill.
U. S. F. C.—Naushon Island, Mass., shore.

64. **Thelepus cincinnatus** Verrill.
U. S. F. C.—Bay of Fundy.

65. **Thelepus cincinnatus** Verrill.
U. S. F. C.—Off Chatham, Mass., 16 to 40 fath.

66. **Potamilla reniformis** Mgn.
U. S. F. C.—Off Chatham, Mass., 16 to 40 fath.

67. **Filigrana implexa** Berkeley.
U. S. F. C.—Off Chatham, Mass., 16 to 40 fath.

### GEPHYREA.

68. **Phascolosoma Gouldii** Dies.
U. S. F. C.—Newport, R. I., shore.

69. **Phascolion Strombi** Theel.
U. S. F. C.—Narragansett Bay, R. I., 10 to 20 fath.

70. **Phascolion Strombi** Theel.
U. S. F. C.—Off Martha's Vineyard, 40 to 150 fath.

### CHÆTOGNATHA.

71. **Sagitta elegans** Verrill.
U. S. F. C.—Vineyard Sound, Mass., surface.

## MOLLUSCA.

### CEPHALOPODA.

72. **Loligo Pealei** Lesueur.
U. S. F. C.—Vineyard Sound, Mass.

73. **Loligo Pealei** Lesueur. Young.
U. S. F. C.—Buzzard's Bay., Mass., 7 fath.

74. **Loligo Pealei** Lesueur. Young.
U. S. F. C.—Off Newport, R. I., 10 to 20 fath.

75. **Loligo Pealei** Lesueur. Eggs.
U. S. F. C.—Narragansett Bay, R. I.

76. **Heteroteuthis tenera** Verrill.
U. S. F. C.—Off Martha's Vineyard, 85 to 225 fath.

77. **Octopus Bairdii** Verrill.
U. S. F. C.—Off Martha's Vineyard, 200 to 388 fath.

### GASTROPODA.

78. **Fulgur carica** Conrad. Dry.
U. S. F. C.—Narragansett Bay, R. I.

79. **Fulgur carica** Conrad.
U. S. F. C.—Narragansett Bay, R. I.

80. **Sycotypus canaliculatus** Gill. Dry.
U. S. F. C.—Southern New England.

81. **Sycotypus canaliculatus** Gill.
U. S. F. C.—New Haven, Conn.

82. **Neptunea propinqua** (Alder).
U. S. F. C.—Off Martha's Vineyard, 65 to 300 fath.

83. **Neptunea (Siphonella) pygmæa** Verrill.
U. S. F. C.—Off Martha's Vineyard, 65 to 150 fath.

84. **Neptunea Stimpsoni** var. (Mörch).
U. S. F. C.—Off Martha's Vineyard, 40 to 100 fath.

85. **Buccinum undatum** Linné.
U. S. F. C.—Off Martha's Vineyard, Mass., 28 to 40 fath.

86. **Tritia trivittata** H. and A. Adams.
U. S. F. C.—Off Newport, R. I.

87. **Ilyanassa obsoleta** Stimp.
U. S. F. C.—Newport, R. I., shore.

88. **Urosalpinx cinerea** Stimp.
U. S. F. C.—Newport, R. I., shore.

89. **Eupleura caudata** Stimp.
U. S. F. C.—Buzzard's Bay, Mass.

90. **Purpura lapillus** Lamarck.
U. S. F. C.—Newport, R. I., shore.

91. **Astyris lunata** (Say) Dall.
U. S. F. C.—Wood's Holl, Mass.

92. **Anachis avara** (Say). Perk.
U. S. F. C.—Wood's Holl, Mass.

93. **Lunatia heros** H. & A. Adams. Dry.
U. S. F. C.—Vineyard Sound, Mass.

94. **Neverita duplicata** Stimp. Dry.
U. S. F. C.—Vineyard Sound, Mass.

95. **Cingula Jan-Mayeni** (Fr.) Verrill.
U. S. F. C.—Off Martha's Vineyard, 238 to 500 fath.

96. **Littorina littorea** Menke.
U. S. F. C.—Newport, R. I., shore.

97. **Littorina palliata** Gould.
U. S. F. C.—Newport, R. I., shore.

98. **Littorina rudis** Gould.
U. S. F. C.—Newport, R. I., shore.

99. **Bittium nigrum** (Totten) Stimp.
U. S. F. C.—Wood's Holl, Mass.

100. **Crepidula fornicata** Lam.
U. S. F. C.—Buzzard's Bay, Mass.

101. **Crepidula convexa** Say. Dry.
U. S. F. C.—Off Newport, R. I.

102. **Crepidula plana** Say.
U. S. F. C.—Off Newport, R. I.

103. **Acmæa testudinalis** Han.
U. S. F. C.—Eastport, Me., shore.

104. **Fiona nobilis** Ald. & Han.
U. S. F. C.—Off Martha's Vineyard, surface.

105. **Pleurobranchia tarda** Verrill.
U. S. F. C.—Off Martha's Vineyard, 65 to 200 fath.

106. **Scaphander puncto-striatus** (Mighels).
U. S. F. C.—Off Martha's Vineyard, 115 to 372 fath.

107. **Melampus lineatus** Say.
U. S. F. C.—Newport, R. I., shore.

108. **Trachydermon ruber** Carp.
U. S. F. C.—Eastport, Me.

109. **Trachydermon albus** Carp.
U. S. F. C.—Eastport, Me.

### SOLENOCONCHA.

110. **Dentalium striolatum** Stimp.
U. S. F. C.—Eastport, Me., 10 to 30 fath.

### LAMELLIBRANCHIATA.

111. **Teredo megotara** Hanley.
U. S. F. C.—Off Martha's Vineyard, surface.

112. **Clidiophora trilineata** Carp. Dry.
U. S. F. C.—Buzzard's Bay, Mass., 7 fath.

113. **Mulinia lateralis** Gray. Young.
U. S. F. C.—Narragansett Bay, R. I.

114. **Callista convexa** H. & A. Ad. Dry.
U. S. F. C.—Buzzard's Bay, Mass.

115. **Tottenia gemma** Perkins. Dry.
U. S. F. C.—Provincetown, Mass., shore.

116. **Cyprina islandica** Lam. Dry.
U. S. F. C.—Off Newport, R. I.

117. **Loripes lens** Verrill & Smith.
U. S. F. C.—Off Martha's Vineyard, 85 to 120 fath.

118. **Venericardia borealis** Carp.
U. S. F. C.—Off Newport, R. I., 13 to 15 fath.

119. **Astarte undata** Gould.
U. S. F. C.—Narragansett Bay, R. I., 20 to 27 fath.

120. **Astarte crenata** Gray.
U. S. F. C.—Off Martha's Vineyard, 100 to 365 fath.

121. **Nucula proxima** Say. Dry.
U. S. F. C.—Narragansett Bay, R. I.

122. **Nucula proxima** Say.
U. S. F. C.—Buzzard's Bay, Mass.

123. **Yoldia limatula** Woodward.
U. S. F. C.—Narragansett Bay, R. I., 11 fath.

124. **Yoldia sapotilla** Stimp.
U. S. F. C.—76 miles S. of Martha's Vineyard, 100 fath.

125. **Yoldia thraciformis** (Storer) Stimp.
U. S. F. C.—Gulf of Maine, 50 to 100 fath.

126. **Scapharca transversa** Ad. Dry.
U. S. F. C.—Off New Haven, Conn.

127. **Limopsis minuta** (Phil.).
U. S. F. C.—Off Martha's Vineyard, 238 to 365 fath.

128. **Modiola modiolus** Turton.
U. S. F. C.—Eastport Harbor, Maine.

129. **Modiola plicatula** Lam.
U. S. F. C.—Newport, R. I., shore.

130. **Mytilus edulis** Linn.
U. S. F. C.—Newport, R. I., shore.

131. **Pecten irradians** Lam.
U. S. F. C.—Provincetown, Mass., shore.

132. **Pecten tenuicostatus** Mighels.
U. S. F. C.—Off Martha's Vineyard, 45 fath.

133. **Pecten tenuicostatus** Mighels. Dry.
U. S. F. C.—Off Newport, R. I.

134. **Pecten vitreus** Woodward.
U. S. F. C.—Off Martha's Vineyard, 300 to 458 fath.

135. **Anomia glabra** Verrill.
U. S. F. C.—Buzzard's Bay, Mass., 5 fath.

## TUNICATA.

136. **Ascidiopsis complanata** Verrill.
U. S. F. C.—Eastport Harbor, Me., 15 fath.

137. **Ciona ocellata** Verrill.
U. S. F. C.—Newport, R. I., shore.

138. **Molgula manhattensis** Verrill.
U. S. F. C.—Wood's Holl, Mass., shore.

139. **Halocynthia partita** Verrill.
U. S. F C.—Newport, R. I., shore.

140. **Halocynthia pyriformis** Verrill.
U. S. F. C.—Eastport, Me.

141. **Boltenia Bolteni** (Linné.)
U. S. F. C.—Eastport Harbor, Me., 15 fath.

142. **Perophora viridis** Verrill.
U. S. F. C.—Wood's Holl, Mass., shore.

143. **Botryllus Gouldii** Verrill.
U. S. F. C.—Newport Harbor, R. I.

144. **Botryllus Gouldii** Verrill.
U. S. F. C.—Wood's Holl, Mass.

145. **Amorœcium pellucidum** Verrill.
U. S. F. C.—Vineyard Sound, Mass.

146. **Amorœcium stellatum** Verrill.
U. S. F. C.—Vineyard Sound, Mass.

147. **Amorœcium constellatum** Verrill.
U. S. F. C.—Vineyard Sonnd, Mass.

148. **Leptoclinum albidum** Verrill.
U. S. F. C.—Vineyard Sound, Mass.

149. **Salpa Caboti** Desor.
U. S. F. C.—Off Newport, R. I., surface.

150. **Salpa.** (Large species.)
U. S. F. C.—Off Martha's Vineyard, surface.

## MOLLUSCOIDA.

### BRACHIOPODA.

151. **Terebratulina septentrionalis** Gr.
U. S. F. C.—Eastport Harbor, Me., 15 fath.

### POLYZOA.

152. **Bugula turrita** Verrill.
U. S. F. C.—Vineyard Sound, Mass.

153. **Bugula Murrayana** Busk.
U. S. F. C.—Off Cape Cod, Mass.

154. **Gemellaria loricata** Busk.
U. S. F. C.—Off Cape Cod, Mass.

155. **Electra pilosa** Fisch.
U. S. F. C.—Narragansett Bay, R. I.

156. **Lepralia americana** Verrill. Dry.
U. S. F. C.—Newport Harbor, R. I.

157. **Discopora nitida** Verrill.
U. S. F. C.—Vineyard Sound, Mass.

## ECHINODERMATA.

### HOLOTHURIOIDEA.

158. **Thyone Briareus** Selenka.
U. S. F. C.—Wood's Holl, Mass., shore.

159. **Leptosynapta Girardii** Verrill.
U. S. F. C.—Newport, R. I., shore.

### ECHINOIDEA.

160. **Schizaster fragilis** (Dub. & Kor.) Dry.
U. S. F. C.—Off Martha's Vineyard, 100 to 258 fath.

161. **Echinarachnius parma** Gray. Dry.
U. S. F. C.—Cape Cod Bay, Mass.

162. **Strongylocentrotus dröbachiensis** A. Ag.
U. S. F. C.—Off Newport, R. I.

163. **Arbacia punctulata** Gray.
U. S. F. C.—Newport Harbor, R. I., shore.

### ASTERIOIDEA.

164. **Asterias Forbesii** Verrill.
U. S. F. C.—Newport, R. I., shore.

165. **Asterias vulgaris** Verrill.
U. S. F. C.—Off Martha's Vineyard, 20 to 50 fath.

166. **Asterias stellionura** Perrier.
U. S. F. C.—Off Nova Scotia, 90 to 200 fath.

167. **Leptasterias compta** Verrill.
U. S. F. C.—Off Block Id., R. I., 27 fath.

168. **Leptasterias compta** Verrill.
U. S. F. C.—Off Martha's Vineyard, 25 to 55 fath.

169. **Stephanasterias albula** Verrill.
U. S. F. C.—80 miles off Nantucket, 94 fath.

170. **Hippasteria phrygiana** Ag. Dry.
U. S. F. C.—Gulf of Maine, 50 to 100 fath.

171. **Cribrella sanguinolenta** Lütk.
U. S. F. C.—Bay of Fundy, 10 to 20 fath.

172.—**Odontaster hispidus** Verrill.
U. S. F. C.—Off Martha's Vineyard, 70 to 200 fath.

173. **Ctenodiscus crispatus** D. and Kor.
U. S. F. C.—Massachusetts Bay.

174. **Archaster americanus** Verrill.
U. S. F. C.—Off Martha's Vineyard.

175. **Archaster Agassizii** Verrill.
U. S. F. C.—Off Martha's Vineyard.

176. **Archaster Floræ** Verrill.
U. S. F. C.—Off Martha's Vineyard, 200 to 350 fath.

### OPHIUROIDEA.

**177. Ophiopholis aculeata** Gray.
U. S. F. C.—Gulf of Maine.

**178. Ophiopholis aculeata** Gray.
U. S. F. C.—Off Martha's Vineyard, 130 to 200 fath.

**179. Ophioglypha Sarsii** Lyman.
U. S. F. C.—Off Martha's Vineyard, Mass., 45 fath.

**180. Ophioglypha Sarsii** Lym. Dry.
U. S. F. C.—Off Martha's Vineyard, Mass.

**181. Ophioscolex glacialis** M. & Tr.
U. S. F. C.—Off Martha's Vineyard, 200 to 258 fath.

**182. Ophiocnida olivacea** Lyman.
U. S. F. C.—Off Martha's Vineyard, 85 to 125 fath.

**183. Ophiacantha millespina** Verrill.
U. S. F. C.—Off Martha's Vineyard, 130 to 260 fath.

**184. Amphiura macilenta** Verrill.
U. S. F. C.—Off Martha's Vineyard, 61 fath.

**185. Astrophyton Agassizii** Stimp.
U. S. F. C.—Off Cape Cod, Mass., 20 to 30 fath.

**186. Astrophyton Agassizii** Stimp. Dry.
U. S. F. C.—Off Cape Cod, 20 to 30 fath.

### CRINOIDEA.

**187. Antedon dentatum** (Say) Verrill. (= **Sarsii** D. & K.)
U. S. F. C.—75 miles S. of Nantucket, 146 fath.

**188. Antedon dentatum** (Say) V. (= **Sarsii** D. & K.)
U. S. F. C.—Off Martha's Vineyard, 183 to 258 fath.

## CŒLENTERATA.

### ANTHOZOA.

**189. Pennatula aculeata** Dan.
U. S. F. C.—82 miles S. of Martha's Vineyard, 202 fath.

**190. Renilla reniformis.**
U. S. F. C.—Beaufort, N. C.

**191. Acanella Normani** Verrill.
U. S. F. C.—Off Martha's Vineyard.

**192. Alcyonium carneum** Ag.
U. S. F. C.—Off Cape Cod, 20 to 25 fath.

**193. Metridium marginatum** Edw. & H.
U. S. F. C.—Newport, R. I., shore.

**194. Sagartia abyssicola** Verrill.
U. S. F. C.—Off Martha's Vineyard, 100 to 300 fath.

**195. Urticina nodosa** Verrill.
U. S. F. C.—80 miles S. of Martha's Vineyard, 160 fath.

**196. Halocampa producta** Stimp.
U. S. F. C.—Newport, R. I., shore.

**197. Epizoanthus americanus** Verrill.
U. S. F. C.—75 miles S. of Martha's Vineyard, 86 fath.

**198. Epizoanthus paguriphila** Verrill.
U. S. F. C.—87 miles S. of Martha's Vineyard, 312 fath.

### HYDROIDEA.

**199. Obelia geniculata** Hincks.
U. S. F. C.—Off Newport, R. I., 13 fath.

**200. Sertularella tricuspidata** Hincks.
U. S. F. C.—George's Bank, 30 to 50 fath.

**201. Sertularia cupressina** Linné.
U. S. F. C.—Off Nova Scotia.

**202. Sertularia pumila** Linné.
U. S. F. C.—New Haven, Conn.

**203. Diphasia fallax** Agassiz.
U. S. F. C.—Eastport Harbor, Me., 15 fath.

**204. Globiceps tiarella** Ayres.
U. S. F. C.—Newport Harbor, R. I.

## PORIFERA.

### SILICEA.

**205. Microciona prolifera** Verrill. Dry.
U. S. F. C.—New Haven, Conn.

**206. Microciona prolifera** Verrill. Dry.
U. S. F. C.—Wood's Holl, Mass.

**207. Cliona sulphurea** Verrill.
U. S. F. C.—Narragansett Bay, R. I., 4 fath.

**208. Suberites compacta** Verrill.
U. S. F. C.—Massachusetts Bay.

**209. Tethya gravata** Hyatt.
U. S. F. C.—Buzzard's Bay, Mass., 5 fath.

## PROTOZOA.

### RHIZOPODA.

**210. Astrorhiza arenacea.** (Sch.)
U. S. F. C.—Off Block Island, R. I., 28 fath.

# LIST OF MARINE INVERTEBRATES FROM THE NEW ENGLAND COAST, DISTRIBUTED BY THE UNITED STATES NATIONAL MUSEUM.

## SERIES III.—EDUCATIONAL SERIES.

PREPARED BY RICHARD RATHBUN.

The United States National Museum, having received frequent applications for collections representing the principal groups of marine invertebrate animals occurring upon our coast, and suitable for class demonstration, in connection with zoological lectures, has prepared fifty collections of this character, for distribution the present winter. The specimens necessary for this undertaking have been selected from among the duplicates accumulated by the United States Fish Commission, in their explorations of the New England coast, and, therefore, represent only those groups which occur more or less abundantly in the waters of that region. At the present time, it is impossible to enlarge these sets, as many of the representative species, which it would be desirable to include in them, are of too rare occurrence, and have been collected only in small numbers.

The specimens are all preserved in alcohol, unless otherwise indicated in the list, and each set contains all the species enumerated.

WASHINGTON, D. C., *November*, 1881.

## CRUSTACEA.

### DECAPODA.

1. **Gelasimus pugnax** Smith.
FIDDLER CRAB.
U. S. F. C.—New Haven, Conn., shore.

2. **Callinectes hastatus** Ordway.
BLUE CRAB; EDIBLE CRAB.
U. S. F. C.—Chesapeake Bay.

3. **Cancer irroratus** Say.
ROCK CRAB.
U. S. F. C.—Vineyard Sound, Mass.

4. **Libinia emarginata** Leach.
SPIDER CRAB.
U. S. F. C.—Vineyard Sound, Mass.

5. **Euprognatha rastellifera** Stimp.
U. S. F. C.—74 miles S. of Nantucket Id., 76 fath.

6. **Hippa talpoida** Say.
SAND BUG; BAIT BUG.
U. S. F. C.—Wood's Holl, Mass., shore.

7. **Eupagurus pollicaris** Stimp.
HERMIT CRAB.
U. S. F. C.—New Haven, Conn.

8. **Eupagurus longicarpus** Stimp.
HERMIT CRAB.
U. S. F. C.—Narragansett Bay, R. I., 5 to 15 fath.

9. **Parapagurus pilosimanus** Smith.
HAIRY-CLAWED HERMIT CRAB.
U. S. F. C.—87 miles S. of Martha's Vineyard, 312 fath.

10. **Munida**, sp.
U. S. F. C.—73 miles S. of Martha's Vineyard, 65 fath.

11. **Homarus americanus** Edw.
AMERICAN LOBSTER.
U. S. F. C.—New England coast.

12. **Crangon vulgaris** Fabr.
COMMON SHRIMP.
U. S. F. C.—Narragansett Bay, R. I.

13. **Pandalus leptocerus** Smith.
DEEP-WATER PRAWN.
U. S. F. C.—60 miles S. of Martha's Vineyard, 45 fath.

14. **Palæmonetes vulgaris** Stimp.
COMMON PRAWN.
U. S. F. C.—Narragansett Bay, R. I.

### SCHIZOPODA.

**15. Thysanopoda norvegica** M. Sars.
Surface Shrimp.
U. S. F. C.—Bay of Fundy, surface.

### AMPHIPODA.

**16. Orchestia agilis** Smith.
Sand Flea; Beach Flea.
U. S. F. C.—Newport, R. I., shore.

**17. Talorchestia longicornis** Smith.
Large Sand Flea.
U. S. F. C.—New Haven, Conn., shore.

**18. Ptilocheirus pinguis** Stimp.
U. S. F. C.—Long Id. Sd., off Noank, Conn.

### ISOPODA.

**19. Idotea robusta** Kröyer.
U. S. F. C.—Off Block Id., R. I., surface.

**20. Ligia oceanica** Fabr.
U. S. F. C.—Newport, R. I., shore.

### ENTOMOSTRACA.

**21. Artemia gracilis** Verrill.
Brine Shrimp.
U. S. F. C.—New Haven, Conn.

**22. Temora longicornis** Müller.
Menhaden feed.
U. S. F. C.—Block Id. Sound, surface.

### CIRRIPEDIA.

**23. Lepas fascicularis** Ellis and Sol.
Clear Goose Barnacle.
U. S. F. C.—Vineyard Sound, Mass., surface.

**24. Lepas anatifera** Linn.
Goose Barnacle.
U. S. F. C.—100 miles off Martha's Vineyard, surface.

**25. Balanus balanoides** Stimp. Dry.
Rock Barnacle; Acorn Shell.
U. S. F. C.—New Haven, Conn., shore.

## MEROSTOMATA.

**26. Limulus Polyphemus** Latr. Dry.
King Crab; Horse-shoe Crab.
U. S. F. C.—Vineyard Sound, Mass., shore.

## ANNELIDA.

### CHÆTOPODA.

**27. Lepidonotus squamatus** Kinb.
U. S. F. C.—Bay of Fundy.

**28. Lætmatonice armata** Verrill.
U. S. F. C.—Off Martha's Vineyard, 100–200 fath.

**29. Nephthys cæca** Johnst.
U. S. F. C.—Cape Ann, Mass., shore.

**30. Nereis virens** Malmgren.
Clam Worm; Bait Worm.
U. S. F. C.—Newport, R. I., shore.

**31. Hyalinœcia artifex** Verrill.
Deep Sea, Tube-dwelling Worm.
U. S. F. C.—80 miles off Martha's Vineyard, 192 fath.

**32. Hyalinœcia artifex** Verrill. Dry.
(Tubes only).
U. S. F. C.—Off Martha's Vineyard, Mass., about 200 fath.

### GEPHYREA.

**33. Phascolosoma Gouldii** Dies.
(Sipunculoid Worm.)
U. S. F. C.—Newport, R. I., shore.

**34. Phascolion Strombi** Theel.
(Sipunculoid Worm.)
U. S. F. C.—Narragansett Bay, R. I., 16 fath.

### CHÆTOGNATHA.

**35. Sagitta elegans** Verrill.
U. S. F. C.—Vineyard Sd., Mass., surface.

## MOLLUSCA.

### CEPHALOPODA.

**36. Loligo Pealei** Lesueur.
Squid.
U. S. F. C.—Vineyard Sound, Mass.

**37. Loligo Pealei** Lesueur. Eggs.
Squid.
U. S. F. C.—Narragansett Bay, R. I.

### GASTROPODA.

**38. Buccinum undatum** Linn.
Whelk.
U. S. F. C.—Eastport, Me., shore.

**39. Tritia trivittata** H. & A. Ad.
U. S. F. C.—Off Newport, R. I.

**40. Ilyanassa obsoleta** Stimpson.
Black Mud-snail.
U. S. F. C.—Gloucester, Mass., shore.

**41. Purpura lapillus** Lamarck.
Purple.
U. S. F. C.—Barnstable, Mass., shore.

**42. Littorina littorea** Menke.
Periwinkle.
U. S. F. C.—Gloucester, Mass., shore.

**43. Littorina palliata** Gould.
Small Periwinkle.
U. S. F. C.—Gloucester, Mass., shore.

**44. Crepidula fornicata Lam.** Dry.
Double-Decker; Boat Shell.
U. S. F. C.—New Haven, Conn.

**45. Trachydermon albus Carp.**
U. S. F. C.—Eastport, Me.

**46. Acmæa testudinalis Han.**
Limpet.
U. S. F. C.—Eastport, Me., shore.

**47. Melampus lineatus Say.**
Salt-marsh Snail.
U. S. F. C.—Newport, R. I., shore.

### SOLENOCONCHA.

**48. Dentalium striolatum** Stimp.
U. S. F. C.—Eastport, Me.

### LAMELLIBRANCHIATA.

**49. Mya arenaria** Linn.
Long Clam.
U. S. F. C.—Gloucester, Mass., shore.

**50. Clidiophora trilineata Carp.** Dry.
U. S. F. C.—Buzzard's Bay, Mass., 7 fath.

**51. Mulinia lateralis Gray.** Young.
U. S. F. C.—Narragansett Bay, R. I.

**52. Venus mercenaria** Linn.
Round Clam; Quahog.
U. S. F. C.—Southern New England.

**53. Tottenia gemma** Perkins. Dry.
U. S. F. C.—Provincetown, Mass., shore.

**54. Nucula proxima Say.**
U. S. F. C.—Narragansett Bay, R. I.

**55. Mytilus edulis** Linn.
Common Mussel.
U. S. F. C.—Newport, R. I., piles of wharves.

**56. Modiola modiolus Turton.**
Horse Mussel.
U. S. F. C.—Eastport, Me., shore.

**57. Modiola plicatula Lamarck.**
Ribbed Mussel.
U. S. F. C.—Newport, R. I., shore.

**58. Pecten irradians Lam.**
Common Scollop.
U. S. F. C.—Buzzard's Bay, Mass.

**59. Pecten tenuicostatus Mighels.**
Smooth Scollop.
U. S. F. C.—Off Martha's Vineyard, 45 fath.

**60. Pecten tenuicostatus Mighels.** Dry.
Smooth Scollop.
U. S. F. C.—Off Martha's Vineyard.

**61. Anomia glabra Verrill.**
Silver-shell; Gold-shell; Jingle-shell.
U. S. F. C.—Buzzard's Bay, Mass., 5 fath.

**62. Ostrea Virginiana Lister.** Dry.
Oyster.
U. S. F. C.—Chesapeake Bay.

## TUNICATA.

**63. Ascidiopsis complanata** Verrill.
Sea Potato.
U. S. F. C.—Eastport Harbor, Me., 15 fath.

**64. Molgula manhattensis** Verrill.
U. S. F. C.—Race Point, Cape Cod, Mass., shore.

**65. Halocynthia partita** Verrill.
U. S. F. C.—Wood's Holl, Mass., shore.

**66. Boltenia Bolteni** (Linn.)
Stemmed Sea-peach.
U. S. F. C.—Eastport Harbor, Me., 15 fath.

**67. Botryllus Gouldii** Verrill.
U. S. F. C.—Newport Harbor, R. I.

**68. Amoroecium pellucidum** Verrill.
U. S. F. C.—Vineyard Sound, Mass.

**69. Amoroecium stellatum** Verrill.
U. S. F. C.—Vineyard Sound, Mass.

**70. Amoroecium constellatum** Verrill.
U. S. F. C.—Vineyard Sound, Mass.

**71. Leptoclinum albidum** Verrill.
U. S. F. C.—Vineyard Sound, Mass., 14 fath.

**72. Salpa Caboti Desor.**
U. S. F. C.—Off Newport, R. I., surface.

## MOLLUSCOIDA.

### BRACHIOPODA.

**73. Terebratulina septentrionalis** Gray.
Lamp Shell.
U. S. F. C.—Eastport Harbor, Me., 15 fath.

### POLYZOA.

**74. Bugula turrita** Verrill.
U. S. F. C.—Narragansett Bay, R. I., 4 fath.

**75. Electra pilosa** Fisch.
U. S. F. C.—Narragansett Bay, R. I.

**76. Lepralia americana** Verrill.
U. S. F. C.—Newport Harbor, R. I.

## ECHINODERMATA.

### HOLOTHURIOIDEA.

**77. Thyone Briareus** Selenka.
Sea-cucumber.
U. S. F. C.—Wood's Holl, Mass., shore.

### ECHINOIDEA.

**78. Strongylocentrotus dröbachiensis A. Ag.**
Common Sea-urchin; Green Sea Egg.
U. S. F. C.—Off Newport, R. I.

79. **Arbacia punctulata** Gray.
Purple Sea-urchin.
U. S. F. C.—Newport Harbor, R. I., shore.

80. **Echinarachnius parma** Gray. Dry.
Sand-dollar.
U. S. F. C.—Cape Cod Bay, Mass.

### ASTERIOIDEA.

81. **Asterias Forbesii** Verrill.
Green Star-fish.
U. S. F. C.—Newport, R. I., shore.

82. **Leptasterias compta** Verrill.
U. S. F. C.—18 miles S. E. of Block Island, R. I., 27 fath.

83. **Ctenodiscus crispatus** D. and Kor.
Velvet Star.
U. S. F. C.—Massachusetts Bay.

84. **Archaster americanus** Verrill.
U. S. F. C.—Off Martha's Vineyard, Mass., about 200 fath.

### OPHIUROIDEA.

85. **Ophiopholis aculeata** Gray.
Variegated Serpent-star.
U. S. F. C.—Gulf of Maine.

86. **Ophioglypha Sarsii** Lyman.
Sars' Serpent-star.
U. S. F. C.—Off Martha's Vineyard, 45 fath.

87. **Ophioglypha Sarsii** Lyman. Dry.
Sars' Serpent-star.
U. S. F. C.—Off Martha's Vineyard, Mass., about 200 fath.

88. **Astrophyton Agassizii** Stimp.
Basket-fish.
U. S. F. C.—Off Cape Cod, Mass.

### CRINOIDEA.

89. **Antedon dentatum** (say) V. (= Sarsii D. & K.). See No. 187, page 303.)
Feather Star.
U. S. F. C.—75 miles S. of Nantucket, 146 fath.

## CŒLENTERATA.

### ANTHOZOA.

90. **Pennatula aculeata** Dan.
Spiny Sea-feather.
U. S. F. C.—82 miles S. of Martha's Vineyard, 202 fath.

91. **Acanella Normani** Verrill.
Jointed Bush-coral.
U. S. F. C.—Off Martha's Vineyard, about 200 fath.

92. **Primnoa reseda** Verrill.
Bush-coral.
U. S. F. C.—Fishing Banks, off Nova Scotia.

93. **Urticina nodosa** Verrill.
Warty Sea-rose.
U. S. F. C.—80 miles S. of Martha's Vineyard, 160 fath.

94. **Epizoanthus americanus** Verrill.
U. S. F. C.—75 miles S. of Martha's Vineyard, 86 fath.

95. **Epizoanthus paguriphila** Verrill.
U. S. F. C.—87 miles S. of Martha's Vineyard, 86 fath.

### HYDROIDEA.

96. **Obelia geniculata** Hincks.
U. S. F. C.—Off Block Island, R. I., 13 fath.

97. **Diphasia fallax** Agassiz.
U. S. F. C.—Eastport Harbor, Me., 15 fath

98. **Globiceps tiarella** Ayres.
U. S. F. C.—Newport Harbor, R. I.

## PORIFERA.

### SILICEA.

99. **Chalina oculata** Bowerb. Dry.
Finger-sponge.
U. S. F. C.—Narragansett Bay, R. I.

100. **Suberites compacta** Verrill. Dry.
U. S. F. C.—Buzzard's Bay, Mass.

101. **Cliona sulphurea** Verrill.
Boring Sponge.
U. S. F. C.—Buzzard's Bay, Mass.

## PROTOZOA.

### RHIZOPODA.

102. **Astrorhiza arenacea** (Sch.)
U. S. F. C.—20 miles S. E. of Block Island, R. I., 28 fath.

## CATALOGUE OF A COLLECTION OF JAPANESE WOODS PRESENTED TO THE UNITED STATES NATIONAL MUSEUM BY THE UNIVERSITY OF TOKIO, JAPAN.

The collection of woods recently presented to the National Museum by the University of Tokio, a catalogue of which is herewith presented, has been prepared in a very unique and artistic manner. Each kind of wood is represented by a polished panel about 9 by 12 inches in dimension, upon which are painted, in color, accurate delineations of the leaves, flowers, and fruit of the tree. Each panel is framed between strips of wood sawn from the outer portion of the tree, and covered with bark provided with corner pieces, which are round blocks cut transversely from branches an inch or more in diameter. The catalogue of this collection has been prepared by Mr. Lester F. Ward, who has supplied the modern approved names for such species as are labeled with the older synonyms. In a few cases no authority could be found for the name given, while in others the species are not named and have been provisionally determined.

### MAGNOLIACEÆ.

1. *Illicium anisatum*, L.
2. *Magnolia hypoleuca*, Sieb. & Zucc.

### BIXINEÆ.

3. *Idesia polycarpa*, Maxim.

### TERNSTRŒMIACEÆ.

4. *Eurya Japonica*, Thunb.
5. *Stuartia monadelpha*, Sieb. & Zucc.
6. *Camellia Sanagua*, Thunb.
7. *Camellia Japonica*, L.

### MALVACEÆ.

8. *Hibiscus Syriacus*, L.

### TILIACEÆ.

9. *Tilia Mandschurica*, Maxim.

### RUTACEÆ.

10. *Xanthoxylum piperitum*, DC.
11. *Citrus trifoliata*, L.
12. *Citrus vulgaris*(?), Riss.

### SIMARUBEÆ.

13. *Picrasma ailanthoides*, Planch.

### MELIACEÆ.

14. *Melia Azedarach*, Adans.

### ILICINEÆ.

15. *Ilex Sieboldi* (?).
16. *Ilex integra*, Thunb.
17. *Ilex crenata*, Thunb.

### CELASTRINEÆ.

18. *Euonymus Sieboldianus*, Blum.

### RHAMNEÆ.

19. *Zizyphus vulgaris*, Lam.
20. *Hovenia dulcis*, Thunb.

### SAPINDACEÆ.

21. *Æsculus turbinata* (?).
22. *Sapindus Mucorossi*, Gaertn.
23. *Acer palmatum*, Thunb.
24. *Acer spicatum* (?), Lam.

### ANACARDIACEÆ

25. *Rhus semialata*, Murr.
26. *Rhus succedanea*, L.
27. *Rhus vernicifera*, DC.

### LEGUMINOSÆ.

28. *Sophora Japonica* (?), L.
29. *Gleditschia Sinensis*, Lam.
    [*G. Japonica*, Lodd.]
30. *Albizzia Julibrissin*, Durazz.

### ROSACEÆ.

31. *Prunus Persica*, Benth. & Hook.
    [*Amygdalus Persica*, L.]
32. *Prunus Mume*, Sieb. & Zucc.
33. *Prunus ssiori* (?), Fr.
34. *Prunus Japonica*, Thunb. (1.)
35. *Prunus Japonica*, Thunb. (2.)
36. *Prunus pseudo-cerasus*, Steud.
37. *Prunus subhirtella* (?).
38. *Pirus Chinensis*, Roxb.
39. *Pirus communis*, L., [var. *Sinensis* ?].
40. *Photinia Japonica*, Benth. & Hook.
41. *Photinia glabra*, Maxim.

### CORNACEÆ.

42. *Cornus officinalis*, Sieb. & Zucc.
43. *Cornus brachypoda*, C. A. Mey.

### CAPRIFOLIACEÆ.

44. *Sambucus racemosa*, L.

### EBENACEÆ.

45. *Diospyros Kaki*, L.
46. *Diospyros Lotus*, L.

### STYRACEÆ.

47. *Styrax Japonicum*, Sieb. & Zucc.

### OLEACEÆ.

48. *Olea Aquifolium*, Thunb.
49. *Olea fragrans*, Thunb.
50. *Ligustrum Ibota*, Sieb. & Zucc.
51. *Ligustrum Japonicum*, Thunb.

### SCROPHULARINEÆ.

52. *Paulownia imperialis*, Sieb. & Zucc.

### GESNERACEÆ.

53. *Didymocarpus Japonicus*, Benth. & Hook.
    [*Rotlera Japonica* Spreng.]

### VERBENACEÆ.

54. *Vitex cannabifolia*, Sieb. & Zucc.
55. *Clerodendron trichotomum*, Thunb.

### LAURINEÆ.

56. *Cinnamomum Loureirii*, Nees.

### ELÆAGNACEÆ.

57. *Elæagnus pungens*, Thunb.

### URTICACEÆ.

58. *Zelkova acuminata*, Planch.
    [*Planera Kaki*, hort.]
    [*Zelkowa Keaki* (?).]
59. *Celtis Sinensis*, Pers.
60. *Aphananthe aspera*, Planch.
61. *Morus alba*, L.

### JUGLANDEÆ.

62. *Juglans Sieboldiana*, Maxim.
63. *Juglans Mandchourica*, Maxim.
64. *Pterocarya rhoifolia*, Sieb. & Zucc.

### CUPULIFERÆ.

65. *Alnus maritima*, Nutt.
66. *Alnus incana*, L.
67. *Quercus dentata*, Thunb.
68. *Quercus glandulifera*, Blume.
69. *Quercus serrata*, Thunb.
70. *Quercus glabra*, Thunb.
71. *Quercus acuta*, Thunb. (1.)
72. *Quercus acuta*, Thunb. (2.)
73. *Quercus glauca*, Thunb.
74. *Quercus cuspidata*, Thunb.
75. *Castanea vulgaris*, Lam.

### SALICINEÆ.

76. *Salix Bürgeriana* (?).

### CONIFERÆ.

77. *Thuya squarrosa*, Benth & Hook.
  [*Retinospora squarrosa*, Sieb. & Zucc.]
  [*Thuyopsis squarrosa* (?).]
78. *Thuya orientalis*, L.
  [*Biota orientalis*, Don.]
79. *Thuya obtusa*, Mill.
  [*Retinospora obtusa*, Sieb. & Zucc.]
  [*Chamæcyparis obtusa*, Endl.]
80. *Thuya pisifera*, Benth. & Hook.
  [*Retinospora pisifera*, Sieb. & Zucc.]
  [*Chamæcyparis pisifera*, Endl.]
81. *Thuya plumosa*, Benth. & Hook.
  [*Chamæcyparis sp.*]
82. *Cryptomeria Japonica*, Don.
83. *Torreya nucifera*, Sieb. & Zucc.
84. *Ginkgo biloba*, L.
85. *Pinus Koraiensis*, Sieb. & Zucc.
86. *Pinus parviflora*, Sieb. & Zucc.
87. *Pinus densiflora*, Sieb. & Zucc.
88. *Pinus Thunbergii*, Parlat.
89. *Abies firma*, Sieb. & Zucc.

### PALMACEÆ.

90. *Chamærops excelsa*, Thunb.

# A PARTIAL BIBLIOGRAPHY OF THE FISHES OF THE PACIFIC COAST OF THE UNITED STATES AND OF ALASKA, FOR THE YEAR 1880.

## By TARLETON H. BEAN.

We have, in Bulletin 11 of the United States National Museum, a bibliography of the fishes of the Pacific coast of the United States, brought up to the end of 1879, by Prof. Theodore Gill. There was, however, such great activity of publication during 1880 on the fishes of the same waters that I have collected the titles of papers in the principal works referring to the region, in order to make them immediately available in conjunction with the Bulletin already printed.

The titles are arranged, for the most part, strictly in the order of their publication; in a few cases, however, this order was not ascertained, and they are simply placed with those published in the same month.

**1879**—Description of a new fish from Alaska (*Anarrhichas lepturus*), with notes upon other species of the genus *Anarrhichas*. By **Tarleton H. Bean.** <Proc. U. S. Nat. Museum, v. 2, pp. 212–218, Dec. 6, 1879.

[Measurements of *Anarrhichas lepturus*, *A. lupus*, *A. latifrons*. Synopsis of all the species.]

**1880**—

Notes on certain typical specimens of American fishes in the British Museum and in the Museum d'Histoire Naturelle at Paris. By **David S. Jordan**, M. D. <Proc. U. S. Nat. Museum, v. 2, Jan. 20, 1880.

[*Ceratichthys cumingi* Günthr. noticed at page 226.]

Descriptions of new species of North American fishes. By **David S. Jordan.** <Proc. U. S. Nat. Museum, v. 2, pp. 235–241, Jan. 20, 1880.

[*Xiphister* proposed as a substitute for *Xiphidion* Girard, at p. 241.]

The salmon industries of Oregon. <The Popular Science Monthly, pp. 573–574, vol. xvi, No. iv, Feb., 1880.

On the Pacific species of *Caulolatilus*. By **W. N. Lockington.** <Proc. Acad. Nat. Sci., Phila., pp. 13–19 (sig. 2), March 23, 1880.

[*Caulolatilus anomalus* (Cooper) Gill and *C. affinis* Gill are conjectured to be identical with *C. princeps* (Jenyns) Gill. The material upon which the above paper is based is insufficient to establish the synonymy proposed. Without some explanation it would be difficult to understand the table of dimensions on page 17: the third column of figures, beginning with 30½, and the second column, beginning with 10.05 inches, should be transposed. The columns beginning with 30½ and 23½ should have this heading: "Hundredths of total length."

Descriptions of new genera and species of fishes from the coast of California. By **W. N. Lockington.** <Proc. U. S. Nat. Museum, v. 2, pp. 326–332, March 25, 1880.

[N. g. and n. s. *Leurynnis paucidens*, n. g. and n. s. *Odontopyxis trispinosus*, n. s. *Artedius quadriseriatus*. *Leurynnis*=*Lycodopsis*, Collett, *fide* Gill, <Proc. U. S. Nat. Museum, v. 3, p. 247. *Odontopyxis*=*Podothecus*, *fide* Jordan and Gilbert, <Proc. U. S. Nat. Museum, v. 3, p. 454.]

Descriptions of some genera and species of Alaskan fishes. By **Tarleton H. Bean.** <Proc. U. S. Nat. Museum, v. 2, pp. 353–359, March 29, 1880.

[*Cottus polyacanthocephalus* Pallas, *Melletes papilio*, n. g. and n. s., *Dallia pectoralis*, n. g. and n. s.]

**1880**—Continued.

Notes on a collection of Fishes from San Diego, California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, v. 3, pp. 23–34, April 26–May 6, 1880.

[An annotated list of 57 species which were collected by the writers in January, 1880. The following new genera are described: *Roncador* and *Leuresthes*, and the new species, *Aphoristia atricauda*, *Dasybatis dipterurus*, and *Platyrhina exasperata.*]

Description of a New Flounder (*Xystreurys liolepis*) from Santa Catalina Island, California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, v. 3, pp. 34–36, May 6, 1880.

Description of a new ray (*Platyrhina triseriata*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, v. 3, pp. 36–38, May 6, 1880.

Description of a new species of "rock cod" (*Sebastichthys serriceps*) from the coast of California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, v. 3, pp. 38–40, May 6, 1880.

On the occurrence of *Cephaloscyllium laticeps* (Duméril) Gill, on the coast of California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, v. 3. pp. 40–42, May 6, 1880.

On the oil shark of Southern California (*Galeorhinus galeus*). By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, v. 3, pp. 42–43, May 6, 1880.

The surf smelt of the northwest coast, and the method of taking them by the Quillehute Indians, west coast of Washington Territory. By **James G. Swan.** <Proc. U. S. Nat. Museum, v. 3, pp. 43–46, May 6, 1880.

[Referring to *Hypomesus pretiosus* Girard, under the name *H. olidus.*]

Description of a new flounder (*Pleuronichthys verticalis*), from the coast of California, with notes on other species. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, v. 3, pp. 49–51, May 6, 1880.

[*Pleuronectes quadrituberculatus* Pallas is here referred to *Pleuronichthys*, but is restored to its proper genus in a subsequent paper by the same authors. The additional species are *Pleuronichthys cœnosus*, *Xystreurys liolepis* and *Atheresthes* (n. g.) *stomias* based upon *Platysomatichthys stomias* Jordan and Gilbert.]

Notes on sharks from the coast of California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, v. 3, pp. 51–52, May 6, 1880.

[*Pleuracromylon lævis* (Risso) Gill recorded from Monterey.]

On the generic relations of *Platyrhina exasperata.* By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, v. 3, p. 53, May 6, 1880.

[*Zapteryx* (n. g.) created for this species.]

Remarks on the species of the genus *Chirus* found in the San Francisco market, including one hitherto undescribed. By **W. N. Lockington.** <Proc. U. S. Nat. Museum, v. 3, pp. 53–57, May 6, 1880.

[*Chirus maculo-seriatus* (n. s.), *C. guttatus* and *C. constellatus* are all equal to *Hexagrammus decagrammus*, *fide* Jordan and Gilbert, same volume, p. 455.]

Description of a new fish from Alaska (*Uranidea microstoma.*) By **W. N. Lockington.** <Proc. U. S. Nat. Museum, v. 3, pp. 58–59, May 6, 1880.

Description of a new species of *Agonidae* (*Brachyopsis verrucosus*), from the coast of California. By **W. N. Lockington.** <Proc. U. S. Nat. Museum, v. 3, pp. 60–63, May 6, 1880.

[*Brachyopsis*, Gill, is defined on page 63.]

Description of a new genus and some new species of California fishes (*Icosteus ænigmaticus* and *Osmerus attenuatus*). By **W. N. Lockington.** <Proc. U. S. Nat. Museum, v. 3, pp. 63–68, May 6–24, 1880.

**1880**—Continued.

Notes on California fishes.—*Salmonidæ*. By **W. N. Lockington.** <Amer. Naturalist, vol. xiv, No. 5, pp. 366–368, May, 1880.

[The statement concerning the anal rays of the Pacific coast salmon as distinguished from those of European salmon and all trout may have been obscured by some typographical error. The list of species on page 368 should be compared with Jordan and Gilbert's list of Pacific coast species in Proc. U. S. Nat. Museum, iii, pages 452 to 458, in order to make it agree with the latest nomenclature. *Hypomesus olidus* is not Californian; the Californian species is *H. pretiosus*.]

Description of a new species of *Sebastichthys* (*Sebastichthys miniatus*), from Monterey Bay, California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 70–73, May 24, 1880.

Description of a new species of "rock-fish" (*Sebastichthys carnatus*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 73–75, May 24, 1880.

Check list of duplicates of North American fishes distributed by the Smithsonian Institution in behalf the United States National Museum, 1877–'80. By **Tarleton H. Bean.** <Proc. U. S. Nat. Museum, vol. 3, pp. 75-116, May 24–June 7, 1880.

[15 west coast species were distributed.]

Description of a new species of ray (*Raia stellulata*) from Monterey California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 133–135, July 2, 1880.

Descriptions of new species of *Xiphister* and *Apodichthys*, from Monterey, California. <Proc. U. S. Nat. Museum, iii, pp. 135–140, July 2, 1880.

[*Xiphister chirus* n. s., *Xiphister rupestris* n. s., *Apodichthys fucorum* n. s. The writers, on page 138, express the opinion that *Cebedichthys*, *Xiphister*, and *Apodichthys* do not represent distinct families.]

Description of two new species of *Sebastichthys* (*Sebastichthys entomelas* and *Sebastichthys rhodochloris*), from Monterey Bay, California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 142–146, July 2, 1880.

[List of the species of *Sebastichthys* obtained in Monterey Bay, pp. 145–146.]

On the occurrence of a species of *Cremnobates* at San Diego, California. By **Rosa Smith.** <Proc. U. S. Nat. Museum, iii, pp. 147–149, July 2, 1880.

[*Cremnobates integripinnis* n. s.]

Description of a new Agonoid fish (*Brachyopsis xyosternus*), from Monterey Bay, California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 152–154, July 2, 1880.

Description of a new flounder (*Hippoglossoides exilis*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 154–156, July 2, 1880.

The herring of the Pacific coast. By **W. N. Lockington.** <Amer. Naturalist, vol. xiv, No. 7, pp. 518, 519, July, 1880.

[Distinguishing characters of *Clupea sagax* and *C. mirabilis*.]

Ichthyologische Beiträge (ix). Von Dr. **Franz Steindachner**, wirklichem Mitgliede der k. Akademie der Wissenschaften. (Mit 6 Tafeln.) (Vorgelegt in der Sitzung am 15. Juli 1880.) <Sitzb. der k. Akad. der Wissensch., B. lxxxii, I Abth., Juli-Heft, pp. 29 (238–266), 1880.

II.—Über zwei neue Agonus—Arten aus Californien. *Agonus* (*Brachyopsis*) *Barkani* n. sp., Taf. v.

[From San Francisco. Equals *Brachyopsis verrucosus* Lockington, according to Jordan and Gilbert, Proc. U. S. N. M., iii, p. 332.]

*Agonus* (*Brachyopsis*) *Annæ* n. sp., Taf. vi, figs. 1–16.

[Vicinity of San Francisco. Equals *Brachyopsis xyosternus* Jordan and Gilbert, according to Jordan and Gilbert, *op. et loc. cit.*]

**1880**—Continued.

III.—Über einige Fischarten aus dem nördlichen Japan, gesammelt vom Professor **Dybowski**.

[*Sebastes Taczanowskii* n. s., *Hypoptychus Dybowskii* n. g. and n. s., *Centronotus Dybowskii* n. s., *Centronotus Taczanowskii* n. s., *Neozoarces pulcher* n. g. and n. s., *Gasterosteus japonicus* n. s. *Urocentrus pictus* Kner is referred to *Centronotus*, and *Centronotus quinquemaculatus* Kner to *Opisthocentrus quinquemaculatus* Kner. The types of the last two species were from De Castries Bay, and not from Pinang and Singapore—(Steind.).]

Notes on new and rare fishes of the Pacific coast. By **W. N. Lockington**. <Amer. Naturalist, vol. xiv, No. 8, pp. 595–600, August, 1880.

[Remarks on recent discoveries of the writer and Jordan and Gilbert, relative to species of *Sebastichthys*, *Pleuronichthys*, *Lepidopsetta*, *Agonidæ*, *Embiotocidæ*, *Chiridæ*, *Cottidæ*, *Icosteidæ*, &c., &c. *Pleurogrammus* Gill is partly characterized. Measurements of *Torpedo californica* are given.]

On the identity of the genus *Leurynnis*, Lockington, with *Lycodopsis*, Collett. By **Theodore Gill**. <Proc. U. S. Nat. Museum, iii, pp. 247–248, Sept. 4, 1880.

[New combinations—*Lycodopsis pacificus* and *Lycodopsis paucidens*.]

Description of a new Chiroid fish, *Myriolepis zonifer*, from Monterey Bay, California. By **W. N. Lockington**. <Proc. U. S. Nat. Museum, iii, pp. 248–251, Sept. 4, 1880.

[*Myriolepis zonifer* (n. g. and n. s.).]

Description of a new species of ray, *Raia rhina*, from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 251–253, Sept. 4, 1880.

Description of a new species of *Hemitripterus* from Alaska. By **W. N. Lockington**. <Proc. Acad. Nat. Sci. Phila., pp. 233–236 (sig. 16), Sept. 7, 1880.

[The supposed new species is *H. cavifrons*. I have examined the type in the California Academy of Sciences and do not hesitate to state my belief in its identity with *Hemitripterus americanus* (Gmel.) Storer.]

Description of a new species of *Catostomus* (*Catostomus cypho*) from the Colorado River. By **W. N. Lockington**. <Proc. Acad. Nat. Sci. Phila., pp. 237–240 (sig. 16), Sept. 7, 1880.

The eulachon or candle-fish of the northwest coast. By **James G. Swan**. <Proc. U. S. Nat. Museum, iii, pp. 257–264, Sept. 15, 1880.

[It is now known that the sand smelt referred to on page 258 is *Hypomesus pretiosus* and not *H. olidus*.]

Descriptions of two new species of fishes, *Ascelichthys rhodorus* and *Scytalina cerdale*, from Neah Bay, Washington Territory. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 264–268, Sept. 15, 1880.

[*Ascelichthys* n. g. *Cottid*, *Scytalina* n. g. *Congrogadid*.]

Neue Gattungen und Arten von Fischen. Von **Franz Steindachner**. <Anzeig. Akad. Wien, No. xix, pp. 158–159.

["N. g. *Ptychochromis*, *Ancharius*, *Hypoptychus*, *Neozoarces*, mit Diagnosen."—Zool. Anzeiger, iii, No. 65, p. 460, Sept. 20, 1880.]

Description of two new species of Scopeloid fishes, *Sudis ringens* and *Myctophum crenulare*, from Santa Barbara Channel, California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 273–276, Sept. 28, 1880.

Do flying fish fly? By **C. O. Whitman**. <American Naturalist, vol. xiv, No. 9, pp. 641–653, Sept., 1880.

Description of two new species of flounders (*Parophrys ischyurus* and *Hippoglossoides elassodon*), from Puget's Sound. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 276–280, Sept. 28, 1880.

[Definition of genus *Parophrys* modified, page 277.]

**1880**—Continued.

Description of a new sparoid fish (*Sparus brachysomus*), from Lower California. By **W. N. Lockington.** <Proc. U. S. Nat. Museum, iii, pp. 284-286, Sept. 28, 1880.

Description of seven new species of Sebastoid fishes, from the coast of California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 287-298, Sept. 28, 1880.

[New species: *Sebastichthys atrovirens*, *rubrivinctus*, *vexillaris*, *chlorostictus*, *constellatus*, *rastrelliger* and *fasciolaris* Lockington (a substitute for *Sebastes fasciatus* Girard, the name *fasciatus* being preoccupied).]

Description of a new Embiotocoid (*Abeona aurora*), from Monterey, California, with notes on a related species. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 299-301, Sept. 28, 1880.

[*Ditrema brevipinne* Günther is considered a synonym of *Brachyistius frenatus* Gill.]

Description of a new flounder (*Platysomatichthys stomias*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 301-303, Sept. 28, 1880.

[The writers, in a paper written later than the above, but published earlier (*op. cit.*, p. 51), founded the genus *Atheresthes* for this species.]

Description of a new Embiotocoid fish (*Cymatogaster rosaceus*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert,** <Proc. U. S. Nat. Museum, iii, pp. 303-305, Sept. 28, 1880.

[*Brachyistius frenatus* Gill is referred to the genus *Cymatogaster*.]

Description of a new species of deep-water fish (*Icichthys Lockingtoni*), from the coast of California. By **David S. Jordan** and **Charles H Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 305-308, Sept. 28, 1880.

[*Icichthys* n. g., representing a new family, *Icosteidæ*, which is defined on page 307. *Icosteus* and *Icichthys* compared.]

Description of a new Embiotocoid fish (*Ditrema atripes*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 320-322, Sept. 28-Oct. 27, 1880.

[*Phanerodon* Girard is considered a synonym of *Ditrema*.]

Description of a new Scorpænoid fish (*Sebastichthys maliger*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 322-324, Oct. 27, 1880.

Note on a new flat-fish (*Lepidopsetta isolepis*), found in the markets of San Francisco. By **W. N. Lockington.** <Proc. U. S. Nat. Museum, iii, p. 325, Oct. 27, 1880.

Note on a forgotten paper of Dr. Ayres and its bearing on the nomenclature of the Cyprinoid fishes of the San Francisco markets. By **David S. Jordan.** <Proc. U. S. Nat. Museum, iii, pp. 325-327, Oct. 27, 1880.

[The paper referred to was published in the "Daily Placer Times and Transcript", issue of May 30, 1854; it determines the nomenclature of *Telestes gibbosa*, *Orthodon microlepidotus*, *Pogonichthys macrolepidotus*, and *Catostomus occidentalis*.]

Description of a new Scorpænoid fish (*Sebastichthys proriger*), from Monterey Bay, California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 327-329, Oct. 27, 1880.

Description of a new Agonoid (*Agonus vulsus*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 330-332, Oct. 27, 1880.

[In a foot-note on page 332, *Agonus* (*Brachyopsis*) *Barkani* Steind. is stated to be a synonym of *Brachyopsis verrucosus* Lock., and *Agonus* (*Brachyopsis*) *Annæ* Steind. is said to be antedated by *Brachyopsis xyosternus* Jor. & Gilb.]

Description of a new species of *Hemirhamphus* (*Hemirhamphns rosæ*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 335-336, Oct. 27, 1880.

**1880**—Continued.

Do flying fish fly? By **David S. Jordan.** <Amer Naturalist, vol. xiv, No. 11, pp. 804–805, November, 1880.

[Observations on *Exocœtus californicus* Cooper.]

On the flight of the flying fish. By **C. O. Whitman.** <The Zoologist, London, Third Series, vol. iv, No. 47, November, 1880, pp. 471–481.

["From the Amer. Naturalist for September. Slightly abridged."]

Description of a new species of *Notidanoid* shark (*Hexanchus corinus*), from the Pacific coast of the United States. By **David S. Jordan** and **Charles H. Gilbert.** <Proc. U. S. Nat. Museum, iii, pp. 352–355, Nov. 23–Dec. 21, 1880.

[*Heptranchias maculatus*, described on pages 353 and 354, *Somniosus microcephalus*, *Lamna cornubica*, and *Eulamia* sp. are noted as additions to the list of sharks on the Pacific coast.]

An introduction to the Study of Fishes. By **Albert C. L. G. Günther**, M. A., M. D., Ph. D., F. R. S., Keeper of the Zoological Department in the British Museum. Edingburgh, Adam and Charles Black, 1880.

[West coast species are frequently referred to.]

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## CATALOGUE OF OLD WORLD BIRDS IN THE UNITED STATES NATIONAL MUSEUM.

### By ROBERT RIDGWAY.

The following list includes all the species of extra-American birds at present represented in the collection of the U. S. National Museum, numbered, named, and classified according to Gray's "Hand-list."[*]

The object of this list is to render apparent the desiderata of the National Museum in the way of Old World birds, so that museums or individuals desiring to make exchanges may know what species are wanted. Genera and subgenera not now in the collection, are the chief desiderata, and as many as possible of them are desired, especially of forms belonging or nearly related to groups which are represented in the American avian-fauna.

Fam. GYPÆTIDÆ (I, p. 1).

1. Gypaëtus barbatus.

Fam. VULTURIDÆ.

Subfam. Vulturinæ (I, p. i).

3. Vultur monachus.
5. Otogyps auricularis.
8. Gyps fulvus.
11. bengalensis.

Subfam. Neophroninæ (I, p. 4).

21. Neophron percnopterus.

Fam. FALCONIDÆ.

Subfam. Buteoninæ (I, p. 6).

36. Buteo vulgaris.
38. plumipes. (Juv.)
81. Archibuteo lagopus.
84. asiaticus. (Juv.)
85. hemilasius. (Juv.)

Subfam. Aquilinæ (I, p. 10).

87. Aquila chrysaëtos.
88. imperialis.
91. clanga.
92. nævia.
99. Pseudaëtus bonelli.
100. Hieraaëtus pennatus.
119. Circaëtus gallicus.
128. Spilornis holospilus.
131. Pandion haliaëtus.
139. Poliornis poliogenys. (Juv.)
144. Haliæëtus albicilla.
146. Thalassoaëtus pelagicus. (Juv.)

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[*] Hand-list of the Genera and Species of Birds, distinguishing those contained in the British Museum. By G. R. Gray, F. R. S., etc., Assistant Keeper of the Zoölogical Collections. 3 vols. 8vo. London: 1869–1871.

149. Cuncuma leucogaster.
150. vocifer.
153. Helotarsus ecaudatus. (Juv.)
155. Haliastur indus.
157. sphenurus.

### Subfam. FALCONINÆ (I, p. 18).

160. Hierofalco gyrfalco. (Juv. only!)
165. Falco orientalis.
176. Gennaia saker. (Juv.)
180. Hypotriorchis subbuteo.
181. lunulatus.
182. Dissodectes concolor.
192. Æsalon regulus.
199. Ieracidea berigora.
200. occidentalis.
201. Harpe novæ-zealandiæ.
203. Tinnunculus alaudarius.
207. newtoni.
209. cenchroides.
213. Erythropus vespertinus.
214. amurensis. (♂ ad.)
215. Tichornis cenchris.
219. Ierax caerulescens.
222. sericeus.

### Subfam. MILVINÆ (I, p. 24).

237. Pernis apivorus.
243. Milvus regalis.
244. govinda.
245. migrans.
247. ægyptius.
258. Elanus melanopterus.
261. axillaris.
262. scriptus.

### Sabfam. ACCIPITRINÆ (I, p. 29).

268. Astur palumbarius.
276. Leucospiza novæ-hollandiæ.
277. rayi.
299. Accipter nisus.
327. Urospiza torquata.
329. cirrhocephalus.
330. approximans.
331. rufitorques. (Type.)
342. Micronisus gabar.
347. badius. (Juv.)

### Subfam. CIRCINÆ (I, p. 36).

356. Circus æruginosus.
358. assimilis.
363. jardinii.
364. Strigiceps cyaneus.
368. cinereus.
369. Glaucopteryx cineraceus.
370. pallidus.

## Fam. SERPENTARIIDÆ (I, p. 38).

375. Serpentarius reptilivorus.

## Fam. STRIGIDÆ.

### Subfam. SURNINÆ (I, p. 38).

376. Surnia ulula.
378. Athene noctua.
379. glaux.
387. Tænioglaux whitelii.
394. Microglaux perlata.
396. Hierocoglaux connivens.
397. strenua.
400. Spiloglaux boobook.
403. novæ-zealandiæ.
425. Ninox scutellata.
433. Microptynx passerinum.

### Subfam. BUBONINÆ (I, p. 43).

444. Huhua orientalis.
440. Bubo maximus.
454. Nisuella madagascariensis.
458. Ketupa flavipes.
459. javensis.
461. Scops zorca.
464. sunia.

### Subfam. SYRNIINÆ (I, p. 48).

500. Syrnium aluco.
503. lapponicum.
512. Ptynx uralense.
513. fulvescens. (Pullus.)
514. Bulaca indranee.
539. Otus vulgaris.
553. Phasmoptynx capensis.
554. Nyctala "funerea L."(=*N. tengmalmi* Gm.).

### Subfam. STRIGINÆ (I, p. 52).

558. Strix flammea.
563. delicatula.
564. lulu. (Type.)

## Fam. CAPRIMULGIDÆ.

### Subfam. PODARGINÆ (I, p. 53).

582. Podargus strigoides.
584. megacephalus.
592. Batrachostomus javanensis.

### Subfam. CAPRIMULGINÆ (I, p. 56).

612. Caprimulgus europæus.
614. ruficollis.
626. albonotatus.
633. macrurus.

## Fam. CYPSELIDÆ (I, p. 63).

717. Cypselus apus.

719. Cypselus melba.
723. gallilæensis.
753. Collocalia spodiopygia. (Type.)
759. leucophæa. (Type.)
770. Hirundapus caudacuta.

### Fam. HIRUNDINIDÆ (I, p. 68).

786. Hirundo rustica.
795. Cecropis cucullata.
808. Lillia rufula.
817. Hylochelidon nigricans.
872. Ptyonoprogne rupestris.
880. Chelidon urbica.

### Fam. CORACIADÆ (I, p. 75).

897. Coracias garrula.
906. Eurystomus orientalis.
907. pacificus.
910. glaucurus.

### Fam. EURYLAIMIDÆ.

#### Subfam. Eurylaiminæ (I, p. 77).

916. Eurylaimus javanus.
917. ochromelas.
922. Cymbirhynchus macrorhynchus.

#### Subfam. Calyptomeninæ (I, p. 78).

924. Calyptomena viridis.

### Fam. TROGONIDÆ (I, p. 81).

991. Harpactes kasumba.
992. diardi.
993. Pyrotrogon ardens.
996. Duvaucelius rutilus.

### Fam. ALCEDINIDÆ (I, p. 89).

1060. Dacelo gigas.
1062. cervina.
1063. Choucalcyon gaudichaudi.
1076. Tanysiptera sylvia.
1077. doris.
1085. Halcyon erythrorhyncha.
1095. Entomobia smyrnensis.
1096. gularis.
1097. pileata.
1099. Calialcyon coromandeliana.
1106. Cyanalcyon macleayi.
1112. Sauropatis sancta.
1113. vagans.
1116. chloris.
1120. vitiensis. (Type.)
1130. Todirhamphus sacra.
1131. tuta.
1132. venerata.
1133. recurvirostris.
1137. Lacedo pulchella.
1140. Syma torotoro.
1141. flavirostris.
1166. Corythornis cristata.
1175. Alcyone azurea.
1180. Ceryle rudis.
1183. Megaceryle guttata.

### Fam. MEROPIDÆ (I, p. 98).

1194. Nyctiornis amictus.
1196. Bucia athertoni.
1197. Meropiscus gularis.
1201. Merops apiaster.
1202. Melittophas bicolor.
1205. Blepharomerops ægyptius.
1206. savignyi.
1207. philippinus.
1209. Aërops albicollis.
1210. Phlothrus viridis.
1217. Cosmaërops ornatus.
1219. Sphecophobus angolensis.
1224. Coccolarynx bullocki.

### Fam. UPUPIDÆ.

#### Subfam. Upupinæ (I, p. 103).

1250. Upupa epops.

#### Subfam. Irrisorinæ (I, p. 103).

1259. Irrisor erythrorhynchos.

#### Subfam. Epimachinæ (I, p. 104).

1271. Ptilornis paradisea.
1273. Craspedophora magnifica.

### Fam. PROMEROPIDÆ.

#### Subfam. Nectarininæ (I, p. 106).

1278. Nectarinia famosa.
1282. Cinnyris chalybea.
1287. osea.
1305. Chalcomitra amethystina.
1306. senegalensis.

#### Subfam. Promeropinæ (I, p. 109.)

1338. Promerops cafer.
1353. Anthobaphes violacea.

#### Subfam. Arachnotherinæ.

1365. Arachnothera longirostra.
1377. Arachnoraphis chrysogenys.
1394. Leptocoma hasseltii.
1398. Anthreptes longuemarii.

#### Subfam. Drepaninæ (I, p. 113).

1405. Drepanis coccinea.
1406. Himatione sanguinea.
1407. Hemignathus lucidus.
1409. Moho nobilis.

1412. Psittirostra psittacea.
1432. Microchelidon hirundinaceum.

## Fam. MELIPHAGIDÆ.

### Subfam. Myzomelinæ (I, p. 153).

1980. Myzomela sanguinolenta.
1981. erythrocephala.
1984. jugularis.
1992. nigriventris. (Type.)
2002. Gliciphila fulvifrons.
2005. caledonica.
2008. chlorophæa.
2014. Acanthorhynchus tenuirostris.

### Subfam. Meliphaginæ (I, p. 155).

2016. Meliphaga phrygia.
2017. Ptilotis lewinii.
2022. leucotis.
2023. auricomis.
2027. penicillata.
2028. fusca.
2029. chrysops.
2051. Foulehaio carunculata.
2052. procerior.
2053. Phylidonyris australasiana.
2054. Meliornis novæ-hollandiæ.
2056. sericea.
2058. Prosthemadera novæ-seelandiæ.
2059. Anthornis melanura.
2063. Anthochæra carunculata.
2065. Anellobia mellivora.
2066. lunulata.
2067. Chæoptila angustipluma.
2068. Leptornis samoënsis.
2072. Acanthogenys rufogularis.
2080. Philemon lessoni.
2084. Tropidorhynchus corniculatus.
2089. buceroïdes.
2092. Entomiza cyanotis.
2094. Manorina melanophrys.
2095. Myzantha garrula.

### Subfam. Melithreptinæ (I, p. 161).

2099. Melithreptus lunulatus.
2100. brevirostris.
2103. albogularis.
2107. Zosterops cærulescens.
2111. albogularis.
2113. griseonota.
2114. xanthochroa.
2124. japonica.
2133. madagascariensis.
2142. flaviceps. (Type.)
2151. simplex.
——. minuta Layard. (Loyalty Islands.)
2172. Orosterops montana.

## Fam. ANABATIDÆ.

### Subfam. Sittinæ (I, p. 181).

2484. Sitta cæsia.
2485. syriaca.
2502. Sittella chrysoptera.
2505. pileata.
2507. Acanthisitta chloris.

## Fam. CERTHIIDÆ (I, p. 183).

### Subfam. Certhiinæ.

2512. Certhia familiaris.

### Subfam. Tichodrominæ.

2520. Tichodroma muraria.
2521. Climacteris leucophæa.
2523. scandens.

## Fam. MENURIDÆ.

### Subfam. Menurinæ (I, p. 185).

2529. Menura superba.

### Subfam. Orthonycinæ (I, p. 185).

2532. Orthonyx spinicauda.
2534. Mohoua ochrocephala.

## Fam. TROGLODYTIDÆ.

### Subfam. Troglodytinæ (I, p. 188).

2562. Troglodytes parvulus.

### Subfam. Tatarinæ (I, p. 194).

2679. Tatare longirostris.

## Fam. LUSCINIDÆ.

### Subfam. Malurinæ (I, p. 195).

2689. Orthotomus phyllorrhapheus.
2720. Drymoipus extensicauda.
2731. Drymoica maculosa.
2739. subruficapilla.
2805. Cisticola schœnicola.
2875. Chthonicola sagittata.
2876. Malurus cyaneus.
2882. lamberti.
2887. dorsalis.
2891. callainus.
2892. Stipiturus malachurus.
2903. Cinclorhamphus cruralis.
2904. cantillans.
2905. Megalurus palustris.
2908. Sphenœacus africanus.
2910. punctatus.

### Subfam. Calamodytinæ (I, p. 206).

2917. Calamodyta arundinacea.
2919. orientalis.
2922. palustris.

2926. Calamodyta cantans.
2940. Calamoherpe arundinacea.
2953. Pseudoluscinia luscinioides.
2954. Cettia sericea.
2964. Calamodus schœnobænus.
2969. Lusciniola melanopogon.
2972. Locustella rayi.
2979. Aëdon galactodes.
2988. Thamnobia fulicata.
2990. coryphæus.

### Subfam. SYLVIANÆ (I, p. 212).

3001. Sylvia melanocephala.
3003. Melizophilus undatus.
3004. sarda.
3006. Alsœcus subalpinus.
3007. conspicillatus.
3012. Sterparola cinerea.
3013. curruca.
3016. Sibilatrix sylvicola.
3017. Monachus atricapilla.
3019. rüppellii.
3021. Adophoneus orpheus.
3024. Philacantha nisoria.
3025. Epilais hortensis.
3032. Asilus trochilus.
3033. bonelli.
3034. rufa.
3043. Phyllopneuste polyglotta.
3054. sylvicultrix.
3057. brunnea.
3065. Reguloides proregulus.
3067. superciliosus.
3100. Regulus cristatus.
3101. ignicapillus.
3106. Sericornis frontalis.
3113. Acanthiza nana.
3114. lineata.
3115. pusilla.
3119. flavolateralis.
3125. Geobasileus chrysorrhœa.
3126. reguloïdes.

### Subfam. LUSCININÆ (p. 220).

3151. Luscinia vera.
3152. philomela.
3153. Ruticilla phœnicura.
3154. tithys.
3159. aurorea.
3185. Nemura cyanura.
3193. Erythacus rubecula.
3196. Cyanecula suecica.
3198. cærulecula.
3200. wolfi.
3202. Calliope camtschatkensis.

### Subfam. SAXICOLINÆ (I, p. 224).

3205. Saxicola œnanthe.
3206. albicollis.
3207. stapazina.
3208. leucomela.
3250. Dromolæa leucura.
3274. Pratincola rubicola.
3275. rubetra.
3276. torquata.
3289. Petroica "multicolor, Vig. & H." = *P. leggi* Sharpe.
——. multicolor (Gm.) (Norfolk I.)
3290. Petroica goodenovii.
3291. phœnicea.
3294. pusilla. (Type.)
3298. Erythrodryas rosea.
3300. Melanodryas cucullata.
3307. Myiomoira macrocephala.
3308. Miro albifrons.
3315. Origma rubricata.

### Subfam. ACCENTORINÆ (I, p. 230).

3316. Accentor alpinus.
3324. Tharrhaleus modularis.

## Fam. PARIDÆ.

### Subfam. PARINÆ (I, p. 231).

3328. Parus major.
3329. ater.
3333. Parus minor.
3335. cinereus.
3348. Pœcile palustris.
3349. borealis.
3351. lugubris.
3352. cinctus.
3365. Cyanistes cyaneus.
3366. cæruleus.
3373. Lophophanes cristatus.
3395. Orites caudatus.

### Subfam. ÆGITHALINÆ (I, p. 236).

3416. Ægithalus pendulinus.
3428. Panurus biarmicus.

## Fam. MOTACILLIDÆ.

### Subfam. MOTACILLINÆ (I, p. 245).

3562. Motacilla alba.
3564. yarrelli.
3566. japonica.
3567. luzoniensis.
3569. maderaspatana.
3570. dukhunensis.
3573. capensis.
3576. ocularis.

3578. Budytes flavus.
3579. melanocephala.
3580. cinereocapilla.
3582. rayi.
3583. citreola.
3585. viridis.
3590. flaveola.
3592. Calobates boarula.
3595. Grallina picata.
3607. Ephthianura albifrons.
3608. aurifrons.
3609. tricolor.

### Subfam. ANTHINÆ (I, p. 249).

3614. Anthus spinoletta.
3615. obscurus.
3635. Agodroma campestris.
3640. Pipastes plumatus.
3645. Spipola pratensis.
3646. cervinus.
3649. Corydalla richardi.
3652. striolatus.
3653. malayensis.
3656. australis.
3658. novæ-zealandiæ.
3661. Macronyx capensis.

## Fam. TURDIDÆ.

### Subfam. TURDINÆ (I, p. 253).

3667. Turdus viscivorus.
3673. Arceuthornis pilaris.
3674. naumanni.
3675. fuscatus.
3677. Hylocichla musica.
3678. iliaca.
3387. Oreocincla varia.
3689. lunulata.
——. heinei Caban. (Australia).
3697. Merula vulgaris.
3698. simillima.
3703. sinensis.
3709. xanthopus.
3710. vanikorensis.
——. pritzboueri. (Loyalty Islands.)
3715. Cichloselys cardis.
3720. Thoracocincla torquata.
3721. Cichloides atrogularis.
3723. pallidus.
3724. chrysolaus.
3725. olivaceus.
3728. rufulus.
3734. hortulorum.
3790. Geocichla citrina.
3800. Monticola saxatilis.
3801. Monticola rupestris.
3805. Petrocincla cyanea.
3806. pandos.
3807. solitaria.
3859. Myiophoneus cæruleus.
3862. Arrenga horsfieldi.
3868. Bessonornis caffra.
3884. Copsychus saularis.
3886. mindanensis.
3893. Cercotrichas macrourus.

## Fam. HYDROBATIDÆ (I, p. 266).

3899. Hydrobata cinclus.
3902. asiatica.

## Fam. PYCNONOTIDÆ.

### Subfam. PYCNONOTINÆ (I, p. 268).

3916. Microscelis amaurotis.
3919. Microtarsus melanoleucus.
3921. olivaceus.
3922. Trachycomus ochrocephalus.
3924. Pycnonotus capensis.
3926. barbatus.
3935. brunneus.
3942. Ixos goiavier.
3948. sinensis.
3956. chrysorrhoides..
3960. Otocompser jocosa.
3961. pyrrhotis.
3968. tympanistrigus.
3972. Brachypodius melanocephalus.
3973. metallicus.

### Subfam. PHYLLORNITHINÆ (I, p. 272).

3981. Hypsipetes ganeesa.
3987. nigerrima.
4048. Iole olivaceus.
4070. Phyllornis javensis.
4071. cyanopogon.
4074. icterocephala.
4079. malabarica.

### Subfam. CRATEROPODINÆ (I, p. 277).

4088. Pomatorhinus musicus.
4089. erythrocnemis.
4097. Pomatostomus temporalis.
4106. Malacocircus griseus.
4124. Cinclosoma punctatum.
4125. castanotum.
4126. cinnamomeum.
4127. castaneothorax.
4154. Garrulax perspicillatus.
4184. Petrocyclus cachinnans.
4193. Leucodioptron taivanus.
4204. Psophodes crepitans.

## Fam. DICRURIDÆ.

### Subfam. Dicrurinæ (I, p. 284).

4207. Dicrurus annectans.
4209. bracteatus.
4217. furcatus.
4227. albirictus.
4241. Dissemurus brachyphorus.
4249. Bhringa remifer.
4251. Chibia hottentotta.
4256. Melænornis edolioides.

### Subfam. Ireninæ (I, p. 288).

4266. Irena puella.
4267. malayensis.
4268. cyanogastra.

## Fam. ARTAMIDÆ.

### Subfam. Artaminæ (I, p. 289).

4270. Artamus fuscus.
4274. sordidus.
4277. personatus.
4278. superciliosus.
4279. leucopygialis.
4280. melanoleucus.
4281. mentalis.
4289. Cyanolanius bicolor.

## Fam. ORIOLIDÆ.

### Subfam. Oriolinæ (I, p. 291).

4297. Sphecotheres maxillaris.
4298. flaviventris.
4299. Oriolus galbula.
4305. chinensis.
4319. melanocephalus.
4323. Mimeta viridis.
4324. flavocinctus.

### Subfam. Ptilonorhynchinæ (I, p. 293).

4333. Sericulus melinus.
4335. Ptilonorhynchus holosericeus.
4336. Ailuroedus crassirostris.
4339. Chlamydera nuchalis.
4340. maculata.

## Fam. PITTIDÆ (I, p. 294).

4343. Pitta coronata.
4344. moluccensis.
4347. strepitans.
4356. simillima.
4357. Melanopitta cucullata.
4359. sordida.
4369. Hydrornis maxima.
4370. Phœnicocichla granatina.
4378. Erythropitta erythrogastra.

## Fam. ÆGITHINIDÆ.

### Subfam. Leiotrichinæ (I, p. 312).

4670. Leiothrix lutea.

### Subfam. Ægithininæ (I, p. 314).

4693. Timalia nigricollis.
4694. maculata.
4727. Ægithina scapularis.
4729. lafresnayi.
4730. Malacopteron magnum.
4747. Macronus ptilosus.
4751. Cacopitta lepidopleurus.

## Fam. MUSCICAPIDÆ.

### Subfam. Muscicapinæ (I, p. 319).

4786. Monarcha "carinata Vig. & Horsf." = *M. melanopsis* Vieill.
4807. Pomarea nigra.
4811. Muscicapa griseola.
4814. hypogrammica.
4821. Hedymela atricapilla.
4822. collaris.
4839. Erythrosterna parva.
4848. Zanthopygia narcissina.
4855. Micrœca fascicans.
4878. Cyornis rubeculoides
4879. banyumas.
4892. Cyanoptila cyanomelæna.
4899. Stoporala albicaudata.

### Subfam. Myiagrinæ (I, p. 327).

4910. Seisura inquieta.
4915. Myiagra rubecula.
4918. latirostris.
4922. viridinitens.
4924. caledonica.
4930. azurea.
4935. Muscitodus rufiventris.
4940. Platysteira cyanea.
4953. Rhipidura flabellifera.
4955. albiscapa.
4956. rufifrons.
4966. caniceps.
4973. nebulosa. (Type.)
——. caledonica. (New Caledonia.)
——. verreauxi. (New Caledonia.)
——. bulgeri. (New Caledonia.)
4992. Muscylva lessoni.
4993. Sauloprocta motacilloides.
4998. tricolor.
5005. Tchitrea melanogastra.
5008. ferreti.
5025. Xeocephalus rufus.

### Subfam. CAMPEPHAGINÆ (I, p. 334).

5036. Pericrocotus flammeus.
5040. peregrinus.
5050. cinereus.
5051. griseigularis.
5064. Graucalus melanops.
5065. parvirostris.
5067. mentalis.
5078. hypoleuca.
5079. "Swainsoni Gould" (= *G. lineatus* Sw.).
5090. Gazzola caledonica.
5116. Lalage humeralis.
5123. pacifica.
5128. montrosieri.
5133. Ceblepyris cæsia.

## Fam. LANIIDÆ.

### Subfam. PACHYCEPHALINÆ (I, p. 385).

5828. Colluricincla harmonica.
5848. Cracticus robustus.
5851. cassicus.
5853. Bulestes torquatus.
5857. Falcunculus frontatus.
5859. Pardalotus punctatus.
5861. striatus.
5862. affinis.
5871. Pachycephala gutturalis.
5871. melanura.
5872. rufiventris.
5887. icteroïdes. (Type.)
5888. flavifrons. (Type.)
5890. assimilis.
5904. albifrons. (Type.)
——. littayei. (New Caledonia.)
5911. Hylocharis philomela.
5913. Eopsaltria australis.
5916. caledonica.
5918. flavigastra.
5926. Phæornis obscura.

### Subfam. LANIINÆ (I, p. 390).

5927. Collyrio excubitor.
5928. meridionalis.
5942. Fiscus collaris.
5947. Leucometopon nubicus.
5949. Laniellus shach.
5950. erythronotus.
5965. Enneoctonus collurio.
5966. minor.
5970. Lanius lucionensis.
5971. superciliosus.
5972 magnirostris.
5978. Phoneus senator.

### Subfam. MALACONOTINÆ (I, p. 394).

6009. Laniarius barbarus.
6043. Telophorus gutturalis.
6051. Pomatorhynchus cucullatus.

## Fam. CORVIDÆ.

### Subfam. STREPERINÆ (II, p. 1).

6058. Strepera graculina.
6061. anaphonensis.
6062. Gymnorhina tibicen.
6063. leuconota.

### Subfam. GARRULINÆ (II, p. 2).

6070. Garrulus glandarius.
6073. Garrulus "melanocephalus Gené" (= *G. atricapillus* Geoffr.)
6082. Perisoreus infaustus.

### Subfam. CALLÆATINÆ (II, p. 7).

6141. Callæas cinerea.
6144. Struthidea cinerea.
6149. Dendrocitta sinensis.
6155. Vagabunda rufa.

### Subfam. CORVINÆ.

6161. Nucifraga caryocatactes.
6167. Pica caudata.
6169. media.
6176. Cyanopolius cyana.
6177. cooki.
6181. Corvus corax.
6185. japonensis.
6187. culminatus.
6192. corone.
6193. cornix.
6195. australis.
6199. umbrinus.
6200. ruficollis. (Type of *C. leptonyx* Peale.)
6201. frugilegus.
6208. pastinator.
6223. Pterocorax torquatus.
6230. Lycos monedula.
6234. Anomalocorax splendens.

### Subfam. PYRRHOCORACINÆ (II, p. 15).

6243. Pyrrhocorax alpinus.
6244. Corcorax melanorhamphos.
6245. Coracia graculus.

## Fam. PARADISEIDÆ (II, p. 15).

6247. Paradisea apoda.
6248. minor.
6251. Diphyllodes speciosa.
6252. Cicinnurus regius.

## Fam. STURNIDÆ.

### Subfam. MANUCODIINÆ (II, p. 17).

6259. Manucodia gouldi.

### Subfam. EULABETINÆ (II, p. 18).

6264. Eulabes religiosa.
6267. javanensis.
6275. Gymnops tricolor.

### Subfam. STURNINÆ (II, p. 19).

6280. Pastor roseus.
6282. Acridotheres tristis.
6283. cristatellus.
6291. Gracupica nigricollis. (Juv.)
6292. Temneuchus pagodarum.
6293. malabaricus.
6299. Sturnia sinensis.
6301. pyrrhogenys.
6306. Sturnus vulgaris.
6307. unicolor.
6309. cineraceus.
6316. Creadion carunculatus.
6318. Heterolocha gouldii.

### Subfam. BUPHAGINÆ (II, p. 22).

6319. Buphaga africana.

### Subfam. JUIDINÆ (II, p. 23).

6328. Lamprocolius auratus.
6329. splendidus.
6352. Spreo bicolor.
6357. Pyrrhocheira morio.
6363. Aplonis tabuensis.
6364. cassini. (Type.)
6367. atronitens.
6369. caledonicus.
6370. brevirostris. (Type.)
6376. Calornis metallica.
6388. atrifusca. (Type.)

## Fam. PLOCEIDÆ.

### Subfam. PLOCEINÆ (II, p. 40).

6575. Oriolinus olivaceus.
6613. Ploceus philippensis.
6633. Oryx capensis.

### Subfam. VIDUINÆ (II, p. 47).

6664. Videstrelda paradisea.

### Subfam. SPERMESTINÆ (II, p. 49).

6685. Estrelda astrild.
6707. bengalus.
6710. amandava.
6724. modesta.
6725. ruficauda.
6740. phaëton.
6762. Munia malabarica.
6766. jagori.
——. topela (Hainan).
6767. Donacola castaneothorax.
6776. Padda oryzivora.
6781. Lonchura acuticauda.
6789. Stéganopleura guttata.
6790. castanotis.
6793. Stictoptera bichenovi.
6794. Ægintha temporalis.
6796. Zonæginthus bellus.
6801. Amblynura pealei. (Type of *prasina* Peale.)
6802. cyanovireus. (Type.)

## Fam. FRINGILLIDÆ.

### Subfam. FRINGILLINÆ (II, p. 80).

7166. Fringilla cœlebs.
7168. montifringilla.
7171. Carduelis elegans.
7177. Chrysomitris spinus.
7201. ———? citrinella.
7203. totta.
7206. Dryospiza serinus.
7219. Ligurinus chloris.
7221. kawariba.
7222. sinica.
7243. Petronia diadema.
7251. Montifringilla nivalis.
7257. Passer domesticus.
7258. montanus.
7269. italiæ.
7270. rufipectus. (?)

### Subfam. COCOTHRAUSTINÆ (II, p. 87).

7286. Cocothraustes vulgaris.
7287. japonicus.
7293. Eophona melanura.

### Subfam. PYRRHULINÆ (II, p. 99).

7477. Pyrrhula rubicilla.
7481. coccinea.
7488. Crithagra butyracea.
7493. canicollis.
7507. Carpodacus erythrinus.
7522. Propasser roseus.
7523. Bucanites githagineus.

### Subfam. SPERMOPHILINÆ (II, p. 102).

7529. Uragus sibiricus.

### Subfam. LOXIANÆ (II, p. 108).

7632. Loxia curvirostra.
7633. pityopsittaca.
7637. tænioptera.
7639. Pinicola enucleator.

7645. Linaria cannabina.
7646. flavirostris.
7649. Ægiothus linaria.
7658. Leucosticte arctoa.
7659. brunneonucha.

### Subfam. EMBERIZINÆ (II, p. 111).

7675. Granativora melanocephala.
7678. Hypocentor aureola.
7680. sulphurata.
7682. Melophus melanictera.
7683. Emberiza citrinella.
7684. cirlus.
7687. hortulana.
7688. spodocephala.
7689. personata.
7695. rustica.
7697. miliaria.
7698. cia.
7700. pithyornus.
7704. ciopsis.
7708. schœnicla.
7709. pyrrhuloides.
7716. Fringillaria capensis.
7719. cæsia.
7726. striolata.
7727. Plectrophanes nivalis.
7728. Centrophanes lapponicus.

## Fam. ALAUDIDÆ (II, p. 116).

7734. Otocorys alpestris.
7735. nivalis.
7737. longirostris.
7744. Alauda arvensis.
7753. cælivox.
7760. Lullula arborea.
7762. Galerida cristata.
7767. isabellina.
7775. Calandrella brachydactyla.
7780. Melanocorypha calandra.
7786. Saxilauda calandra.
7794. Alaemon desertorum.
7815. Megalophonus apiatus.

## Fam. COLIDÆ (II, p. 123).

7840. Colius capensis.
7844. Rhabdocolius striatus.

## Fam. MUSOPHAGIDÆ (II, p. 124).

7850. Turacus musophagus.
7852. persa.
7859. Schizorhis cristata.

## Fam. BUCEROTIDÆ (II, p. 127).

7866. Buceros rhinoceros.
7873. Hydrocissa convexa.
7877. Anorrhinus galeritus.
7879. malayanus.
7884. Hydrocorax planicornis.
7892. Penelopides panini.
7898. Tockus nasutus.
7908. Rhinoplax scutatus.

## Fam. PSITTACIDÆ.

### Subfam. PEZOPORINÆ (II, p. 136).

7983. Platycercus pennanti.
7984. adelaidæ.
7988. palliceps.
7989. browni. (?)
7990. eximius.
7994. Psephotus multicolor.
7996. pulcherrimus.
7997. hæmatonotus.
7999. xanthorrhous.
8001. Barnardius barnardi.
8003. semitorquatus.
8004. Purpureicephalus spurius.
8005. Polytelis barrabandi.
8006. melanura.
8008. Aspromictus erythropterus.
8011. cyanopygius.
8014. amboinensis. (?)
8015. Pyrrhulopsis personatus.
8016. splendens. (Type.)
8017. hysginus.
8018. tabuensis. (Type of *atrogularis* Peale.)
8019. Cyanorhamphus novæ-zealandiæ.
8026. auriceps.
8033. Melopsittacus undulatus.
8034. Euphema pulchella.
8039. splendida.
8042. Pezoporus formosus.
8047. Urodiscus discurus. (?)
8051. Palæornis torquatus.
8054. purpureus.
8055. schisticeps.
8056. columboides.
8063. Belocercus longicaudus.
8065. erythrogenys.
8068. javanicus. (?)

### Subfam. LORINÆ (II, p. 151).

8167. Coriphilus taitianus.
8168. smaragdinus.
8169. Loriculus galgulus.
8172. vernalis.
8173. indicus.
8184. Lorius domicella.
8191. Chalcopsitta ater.
8195. Vini kuhlii.

8196. Vini fringillaceus.
8198. Phigys solitarius.

### Subfam. TRICHOGLOSSINÆ (II, p. 155).

8210. Trichoglossus rubritorquis.
8211. novæ-hollandiæ.
8214. massena.
8217. chlorolepidotus.
8224. Ptilosclera versicolor.
8225. Nanodes discolor.
8226. Glossopsitta concinna.
8227. pusilla.
8228. porphyrocephala.
8239. Eclectus linnæi.
8240. rorratus.
8243. Muscarinus polychlorus. (?)
8247. Tanygnathus lucionensis. (?)

### Subfam. NESTORINÆ (II, p. 158).

8252. Nestor meridionalis.

### Subfam. PSITTACINÆ (II, p. 159).

8380. Psittinus incertus.

## Fam. CACATUIDÆ.

### Subfam. CACATUINÆ (II, p. 168).

8383. Calopsitta novæ-hollandiæ.
8384. Cacatua hæmaturopygia.
8391. galerita.
8399. Lophochroa leadbeateri.
8400. sanguinea.
8401. Eolophus roseicapillus.

### Subfam. CALYPTORHYNCHINÆ (II, p. 170).

8405. Calyptorhynchus banksi.
8408. solandri.
8410. funereus.
8412. Callocephalon galeatus.

## Fam. STRIGOPIDÆ.

8416. Strigops habroptilus.

## Fam. CAPITONIDÆ.

### Subfam. POGONORHYNCHINÆ (II, p. 172).

8418. Pogonorhynchus dubius.
8422. torquatus.
8425. leucomelas.

### Subfam. MEGALAIMINÆ (II, p. 173).

8432. Megalaima virens.
8433. versicolor.
8435. chrysopogon.
8436. mystacophanos.
8437. henrici.
8438. armillaris.
8442. Cyanops asiatica.
8445. Xantholæma rosea.
8448. hæmacephala.
8450. duvaucellii.
8454. Chotorea corvina.
8457. caniceps.
8459. viridis.
8479. Calorhamphus lathami.
8487. Psilopogon pyrolophus.

## Fam. PICIDÆ.

### Subfam. PICINÆ (II, p. 181).

8536. Picoides tridactylus.
8540. crissoleucus. (?)
8541. Picus major.
8552. Dendrodromas leuconotus.
8555. Dendrocoptes medius.
8558. Xylocopus minor.
8577. Yungipicus scintilliceps.
8588. moluccensis.
8631. Reinwardtipicus validus.
8634. Dryocopus martius.
8643. Chrysocoloptes sultaneus.
8657. Mesopicus menstruus.
8666. Hemicircus sordidus.
8667. concretus.
8671. Gecinus viridis.
8676. guerini.
8677. canus.
8682. Chrysophlegma miniata.
8686. mentalis.
8687. punicea.
8707. Thriponax javensis.
8746. Brachypternus puncticollis.
8755. Gauropicoides rafflesi.

### Subfam. COLAPTINÆ (II, p. 202).

8838. Meiglyptes tristis. (?)
8839. grammithorax.
8840. Micropternus phaioceps. (?)
8842. brunneus.
8844. squamigularis.

### Subfam. YUNGINÆ (II, p. 204).

8848. Yunx torquilla.

## Fam. CUCULIDÆ.

### Subfam. INDICATORINÆ (II, p. 204).

8854. Indicator variegatus.

### Subfam. PHÆNICOPHAINÆ (II, p. 205).

8867. Rhamphococcyx curvirostris.
8871. Leptogrammus cumingii.
8873. Zanclostomus javanicus.
8881. Rhododytes diardi.
8884. sumatranus.
8885. Rhinortha chlorophæa.

### Subfam. CENTROPODINÆ (II, p. 212).

8956. Centrococcyx viridis.
8965. sinensis.
8980. Nesocentor melanops.
8982. Polophilus phasianus.
8983. macrourus.

### Subfam. CUCULINÆ (II, p. 215).

8985. Cuculus canorus.
9006. Nicoclarius canorinus.
9007. optatus.
9008. tenuirostris.
9013. Cacomantis pallidus.
9015. Ololygon lugubris.
9016. merulinus.
9017. threnodes.
9019. sonneratii. (?)
9020. flabelliformis.
9027. simus. (Type.)
9028. bronzinus.
9042. Lamprococcyx lucidus.
9060. Coccystes glandarius.
9061. coromandus.
9069. Eudynamis malayana. (?)
9070. minandensis.
9071. cyanocephala.
9072. orientalis.
9077. taitiensis.
9078. Scythrops novæ-hollandiæ.

## Fam. COLUMBIDÆ.

### Subfam. TRERONINÆ (II, p. 222).

9090. Crocopus chlorogaster. (?)
9091. Osmotreron malabarica.
9095. olax. (?)
9096. viridis.
9102. Butreron capellei.
9116. Ptilinopus swainsoni.
9117. ewingi.
9121. perousii.
9122. fasciatus.
9124. greyi.
9131. Kurutreron purpuratus.
9134. coralensis. (Type.)
9150. Ramphiculus jambu.
9158. Lamprotreron superbus.

### Subfam. COLUMBINÆ (II, p. 228).

9169. Carpophaga chalybura.
9180. Globicera microcera.
9183. auroræ. (Type.)
9184. vanwycki. (Type.)
9186. Serresius forsteri.
9187. Myristicivora bicolor.
9199. Ducula latrans. (Type.)
9211. Ianthœnas vitiensis.
9214. hypoinochroa.
9216. castaneiceps. (Type.)
9217. Megaloprepia magnifica.
9218. assimilis.
9221. Hemiphaga novæ-zealandiæ.
9222. spadicea.
9225. Ptilocolpha griseopectus.
9228. Leucomelæna norfolciensis.
9230. Lopholaimus antarcticus.
9231. Columba livia.
9233. schimperi.
9234. intermedia.
9241. Palumbæna œnas.
9243. Palumbus torquatus.
9246. elphinstonei.
9286. Geopelia striata.
9287. tranquilla.
9289. Erythrauchœna humeralis.
9290. Stictopeleia cuneata.
9293. Macropygia phasianella.
9294. tenuirostris. (?)
9311. Turtur auritus.
9313. rupicolus.
9315. suratensis.
9316. chinensis.
9317. senegalensis.
9319. cinereus. (?)
9325. Streptopelia semitorquata.
9328. risoria.
9332. humilis.

### Subfam. GOURINÆ (II, p. 239).

9413. Ocyphaps lophotes.
9415. Chalcophaps indica.
9417. chrysochlora.
9418. stephani.
9427. Phaps chalcoptera.
9428. elegans.
9431. Leucosarcia picata.
9432. Phapitreron leucotis.
9439. Calœnas nicobarica.
9442. Phlogœnas luzonica.
9446. erythroptera.
9452. Goura coronata.

## Fam. DIDUNCULIDÆ (II, p. 248).

9455. Didunculus strigirostris.

## Fam. PTEROCLIDÆ.

### Subfam. PTEROCLINÆ (II, p. 249).

9457. Pterocles arenarius.
9467. Pteroclurus alchata.

### Subfam. SYRRHAPTINÆ (II, p. 250).

9471. Syrrhaptes paradoxus.

## Fam. MEGAPODIDÆ.

### Subfam. Talegallinæ (II, p. 254).

9537. Talegallus lathami.

### Subfam. Megapodinæ (II, p. 255).

9547. Megapodius tumulus.

## Fam. PHASIANIDÆ.

### Subfam. Pavoninæ (II, p. 255).

9560. Pavo cristatus.
9563. Polyplectron bicalcaratum.
9572. Argusianus giganteus.

### Subfam. Phasianenæ (II, p. 257).

9574. Phasianus colchicus.
9575. torquatus.
9577. versicolor.
9585. Chrysolophus pictus.
9587. Pucrasia macrolopha.
9589. xanthospila.
9597. Euplocomus vieilloti.
9599. Acomus pyronotus.
9601. Gallophasis albocristatus.
9602. leucomelanos.
9607. Gennæus nycthemerus.

### Subfam. Gallinæ (II, p. 261).

9614. Gallus ferrugineus.
9616. sonnerati.
9620. Creagrius varius. (?)
9621. Ceriornis satyrus.

### Subfam. Numidinæ (II, p. 262).

9629. Numida meleagris.

## Fam. TETRAONIDÆ.

### Subfam. Perdicinæ (II, p. 263).

9647. Pternistes nudicollis.
9652. afer.
9660. Scleroptera africana. (?)
9680. Francolinus vulgaris.
9681. chinensis.
9688. Perdix cinerea.
9705. Coturnix communis.
9707. coromandelica.
9708. pectoralis.
9711. Synoicus australis.
9715. Perdicula cambayensis. (?)
9720. Microperdix erythrorhyncha.
9721. Excalfactoria chinensis. (?)

### Subfam. Rollulinæ (II, p. 269).

9726. Rollulus roulroul.
9727. Melanoperdix niger.

### Subfam. Turnicinæ (II, p. 270).

9729. Turnix sylvatica.
9743. varia.
9749. Arcoturnix pugnax.

### Subfam. Caccabininæ (II, p. 274).

9801. Lerwa nivicola.
9802. Caccabis saxatilis.
9803. græca.
9805. chukar.
9806. rufa.
9811. Alectoris petrosa.
9813. Ammoperdix heyi.
9815. Tetraogallus himalayensis.

### Subfam. Tetraoninæ (II, p. 275).

9819. Tetrao urogallus.
9821. hybridus.
9822. Lyrurus tetrix.
9832. Tetrastes betulinus.
9835. Lagopus scoticus.
9837. mutus.

## Fam CASUARIIDÆ.

### Subfam. Dromaiinæ (III, p. 2).

9845. Dromaius novæ-hollandiæ.

### Subfam. Casuariinæ (III, p. 2).

——. Casuarius (undetermined).

## Fam. APTERYGIDÆ (III, p. 3).

9853. Apteryx australis.
9855. oweni.

## Fam. OTIDIDÆ (III, p. 7).

9913. Otis tarda.
9914. Tetrax campestris.
9921. Choriotis australis.
9930. Afrotis afra.
9937. Houbara undulata.
9938. macqueeni.

## Fam. CHARADRIIDÆ.

### Subfam. Œdicneminæ (III, p. 9).

9939. Œdicnemis crepitans.
9947. Burhinus grallarius.
9948. Esacus magnirostris.

### Subfam. Charadriinæ (III, p. 10).

9950. Vanellus cristatus.
9953. Chettusia gregaria.
9954. wagleri.
9959. Lobivanellus indica.
9961. lobata.

9969. Hoplopterus spinosus.
9976. Sarciophorus pectoralis.
9978. Stephanibyx melanopterus.
9982. Charadrius apricarius.
9984. longipes. (Winter pl. only.)
9985. fulvus. (Winter pl. and young only!)
9989. Eudromias morinellus.
9991. australis.
9992. veredus.
9993. Cirrepidesmus geoffroyi.
9994. mongolicus.
9995. pyrrhothorax.
9998. Ægialites hiaticula.
9999. fluviatilis.
10000. philippinus.
10002. tricollaris.
10008. nigrifrons.
10013. Ochthodromus bicinctus.
10014. Leucopolius marginatus.
10016. kittlitzi.
10020. Ægialophilus cantianus.
10021. ruficapillus.
10024. Anarhynchus frontalis.

## Fam. GLAREOLIDÆ.

### Subfam. Glareolinæ (III, p. 17).

10026. Glareola pratincola.
10031. orientalis.
10032. Stiltia grallaria.

### Subfam. Cursorinæ (III, p. 18).

10035. Pluvianus ægyptius.
10036. Cursorius gallicus.

## Fam. CHIONIDIDÆ (III, p. 20).

10056. Chionis minor.

## Fam. HÆMATOPODIDÆ (III, p. 21).

10057. Hæmatopus ostralegus.
——. osculans Swinh.
10062. longirostris.

## Fam. GRUIDÆ (III, p. 24).

10079. Grus cinerea.
10081. monacha.
10091. australasiana.
10092. Anthropoides virgo.
10094. Balearica pavonina.

## Fam. ARDEIDÆ.

### Subfam. Ardeinæ (III, p. 26).

10099. Ardea cinerea.
10101. pacifica.
10102. Ardea purpurea.
10108. Herodias alba.
10110. intermedia.
——. modesta.
10113. Garzetta nivea.
10117. Demiegretta novæ-hollandiæ.
10120. sacra.
10132. Bubulcus ibis.
10133. coromanda.
10134. Ardeola comata.
10140. prasinicollis. (Juv.)
10146. cinnamomea.
10147. sinensis.
10148. Ardetta minuta.
10157. Butorides javanica.
10160. patruelis. (Type.)

### Subfam. Botaurinæ (III, p. 32).

10161. Botaurus stellaris.
10162. poiciloptilus.
10171. Nyctiardea nycticorax.
10172. caledonica.

## Fam. CICONIIDÆ.

### Subfam. Ciconiinæ (III, p. 34).

10184. Ciconia alba.
10186. Melanopelargus nigra.
10187. episcopus.

### Subfam. Plataleidæ (III, p, 37).

10199. Platalea leucorodia.
10203. Platibis flavipes.
10204. Spatherodia melanorhyncha.

## Fam. TANTALIDÆ.

### Subfam. Tantalinæ (III, p. 38).

10208. Tantalus ibis.

### Subfam. Ibidinæ (III, p. 38).

10214. Plegadis falcinellus.
10220. Carphibis spinicollis.
10221. Threskiornis æthiopicus.
10224. strictipennis.

## Fam. SCOLOPACIDÆ.

### Subfam. Limosinæ (III, p. 41).

10239. Numenius arquata.
10241. tenuirostris.
10246. tahitiensis.
10249. phæopus.
10252. luzoniensis.
10254. minor.
10257. femoralis. (Type.)
10258. Limosa ægocephala.
10259. lapponica.

10261. Limosa uropygialis. (=10262.)
10262. novæ-zealandiæ.
19265. Therekia cinerea.

### Subfam. Totaninæ (III, p. 44).

10266. Totanus stagnatilis.
10267. Helodromas ochrophus.
10268. Rhyacophilus glareola.
10270. Heteroscelus incanus.
10272. ——? calidris.
10275. Erythroscelus fuscus.
10276. Glottis canescens.
10279. Tringoides hypoleucus.
10283. Tryngites cancellata. (Types of *parvirostris*, Peale.)

### Subfam. Recurvirostrinæ (III, p. 47).

10285. Recurvirostra avocetta.
10287. rubricollis.
10291. Cladorhynchus pectoralis.
10292. Himantopus autumnalis.
10295. leucocephalus.
10296. novæ-zealandiæ.

### Subfam. Tringinæ (III, p. 48).

10299. Philomachus pugnax.
10304. Limnocinclus acuminatus.
10305. Limicola platyrhyncha.
10310. Schœniclus cinclus.
10311. Actodromas minuta.
10313. salina.
10314. australis.
10315. Leimonites temmincki.
10319. Ancylocheilus subarquata.
10323. Eurinorhynchus pygmæus.

### Subfam. Scolopacinæ (III, p. 51).

10328. Gallinago major.
10329. scolopacina.
10330. macrodactyla.
10331. australis.
10341. nemoricola.
10342. gallinula.
10343. solitaria.
10344. horsfieldi.
10347. aucklandica. (Types of *holmesi*, Peale).
10352. Scolopax rusticola.
10353. saturata.
10356. Rhynchæa capensis.
10357. bengalensis.
10358. australis.

### Fam. RALLIDÆ.

### Subfam. Ocydrominæ (III, p. 56).

10363. Ocydromus australis.
10365. earlei.
10375. Hypotænidea torquata.
10377. philippensis.
10378. striata.
10390. Rallina fasciata.
10391. fusca.
10395. rubiginosa. (?)
10401. minahasa. (?)

### Subfam. Rallinæ (III, p. 58).

10408. Rallus aquaticus.
——. indicus.
10450. Ortygometra crex.
10451. Porzana maruetta.
10452. novæ-hollandiæ.
10461. Zapornia pygmæa.
10462. minuta.
10463. tabuensis.
10464. quadristrigata.

### Fam. GALLINULIDÆ.

### Subfam. Porphyrioninæ (III, p. 64).

10476. Porphyrio veterum.
10478. melanotus.
10481. indicus.
10484. vitiensis. (Types.)

### Subfam. Gallinulinæ (III, p. 66).

10495. Gallinula chloropus.
10496. tenebrosa.
——. sandwichensis Streets.
10508. Eyrthra phœnicura.
10511. Gallicrex cristata.

### Subfam. Fulicinæ (III, p. 67).

10513. Fulica atra.
10514. australis.
10519. alai. (Types.)
10521. Lupha cristata.

### Fam. PARRIDÆ (III, p. 69).

10537. Metopodius albinucha.
10538. indica.
10539. Hydralector cristata.
10540. Hydrophasianus chirurgus.

### Fam. PHŒNICOPTERIDÆ (III, p. 72).

10544. Phœnicopterus antiquorum.

### Fam. ANATIDÆ.

### Subfam. Plectropterinæ (III, p. 73).

10552. Anseranas melanoleuca.
10555. Sarkidiornis melanonota. (♀)
10557. Chenalopex ægyptiaca.

### Subfam. Anserinæ.

10561. Anser cinereus.
10563. segetum.

10565. Anser albifrons.
10568. Marilochen erythropus.
10574. Cygnopsis cygnoides.
10577. Chlamidochen jubata.
10582. Leucopareia sandwichensis.
10596. Anserella albipennis.

### Subfam. CYGNINÆ (III, p. 78).

10597. Cygnus olor.
10600. Olor cygnus.
10605. Chenopis atratus.

### Subfam. ANATINÆ (III, p. 79).

10608. Dendrocygna arcuata.
10611. major. (?)
10617. Leptotarsis eytoni.
10618. Tadorna cornuta.
10620. Stictonetta nævosa.
10621. Casarca rutila.
10622. tadornoides.
10623. variegata.
10627. Aix galericulata.
10628. Mareca penelope.
10631. punctata.
10646. Anas luzonica.
10647. superciliosa.
10648. chlorotis. (♀ juv. only.)
10656. Querquedula circia.
10661. Nettion crecca.
10663. gibberifrons. (?)*
——. eytoni. (Kerguelen Island.)
10671. Eunetta falcata.
10672. formosa.
——. Chaulelasmus couesi Streets. (Types.)
10675. Marmonetta angustirostris.
10677. Spatula rhynchotis.
10681. Malacorhynchus membranaceus.

### Subfam. FULIGULINÆ.

10683. Fuligula rufina.
10684. Fulix cristata.
10689. Aythya ferina.
10693. Nyroca leucophthalma.
10694. australis.
10710. Oidemia nigra.
10714. Melanetta fusca.

### Subfam. ERISMATURINÆ (III, p. 89).

10716. Biziura lobata.
10718. Erismatura leucocephala.

### Subfam. MERGINÆ (III, p. 91).

10734. Mergellus albellus.

### Fam. PODICIPIDÆ (III, p. 92).

10793. Podiceps cristatus.
10740. australis (= 10793)
10747. Pedeaithyia griseigena.
10751. Dytes auritus.
10753. Proctopus nigricollis.
10763. Sylbeocyclus minor.
10766. novæ-hollandiæ.

### Fam. SPHENISCIDÆ (III, p. 98).

10796. Pygoscelis papua.
10801. antipoda.
10803. Dasyrhamphus adeliæ.
10805. Eudyptila minor.

### Fam. PROCELLARIDÆ.

### Subfam. PELECANOIDINÆ (III, p. 102).

10825. Pelecanoides urinatrix.

### Subfam. PROCELLARINÆ (III, p. 102).

10386. Puffinus assimilis.
——. nativitatus Streets. (Type: Christmas Island.)
10852. Procellaria nereis.
10861. Oceanites lineata. (Type.)
10864. Pelagodroma fregata.
10868. Fregetta melanogastra.
10876. Priocella antarctica.
10881. Œstrelata lessoni.
10882. rostrata. (Type.)
10884. incerta.
10889. parvirostris. (Type.)
——. kidderi Coues. (Type: Kerguelen Island.)
10893. Cookilaria cooki.
10897. mollis. (Type.)
10902. Halobæna caerulea.
10903. Pagodroma nivea.
10907. Pterodroma macroptera.
10915. Majaqueus æquinoctialis.
10921. Pseudoprion turtur.

### Subfam. DIOMEDEINÆ (III, p. 109).

10925. Diomedea exulans.
10929. Thalassarche melanophrys.

### Fam. LARIDÆ.

### Subfam. LARINÆ (III, p. 111).

10905. Larus canus.
10953. Dominicanus vociferus.
10959. Clupeilarus fuscus.
10969. Laroides cachinnans.
10974. michahellesii. (Juv.)
10977. Blasipus crassirostris.

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* From New Zealand = *A. gracilis* Buller.

10979. Adelarus hemprichi.
10980. Icthyaëtus pallasi. (Juv.)
10981. Chroicocephalus ridibundus.
10982. capistratus.
10983. brunneicephalus.
11001. Hydrocolæus minutus.
11002. Gelastes novæ-hollandiæ.
11004. andersoni.

### Subfam. Sterninæ (III, p. 117).

11030. Sterna longipennis.
11034. frontalis.
11044. Actochelidon cantiaca.
11045. affinis.
11057. Thalasseus bergii.
11059. novæ-hollandiæ.
11062. Sternula minuta.
11071. Pelodes hybrida.
11078. albistriata.
——. vittata. (Kerguelen Island.)
11081. Haliplana lunata. (Type.)
11082. Thalassipora infuscata. (?)
11083. Gygis alba.
11089. Procellosterna cinerea.

### Fam. PHAËTONTIDÆ (III, p. 124).

11098. Phaëton rubricaudus.

### Fam. PLOTIDÆ (III, p. 125).

11102. Plotus novæ-hollandiæ.

### Fam. PELECANIDÆ.

### Subfam. Graculinæ (III, p. 126).

11114. Graculus novæ-hollandiæ.
11120. cristatus.
11124. glaucus.
11134. Hypoleucus varius.
11135. leucogaster.
11137. carunculatus.
11140. Stictocarbo punctatus.
11142. Microcarbo pygmæus.
11144. melanognathos. (?)
11146. brevirostris.
11149. sulcirostris.

### Subfam. Pelecaninæ (III, p. 129).

11151. Pelecanus onocrotalus.
11152. crispus.
11153. mitratus.
11154. javanicus.
11158. Catoptropelicanus conspicillatus.

### Subfam. Atageninæ.

11162. Atagen minor.

## NOTES ON SOME COSTA RICAN BIRDS.

### By ROBERT RIDGWAY.

The following birds, all of greater or less interest, have recently been received at the National Museum from Sr. Don José C. Zeledon, of San José:

1. **Catharus fuscater** (Lafr.) Scl. (?)

What seems to be a somewhat immature example of this species appears at first sight to be quite a different bird from two fully adult specimens, a male and a female, from the same country. In these adults the throat and jugulum are entirely uniform dull ash-gray, while the entire abdomen is white.* The specimen in question, however, has the chin and throat indistinctly streaked with dingy whitish and dusky, while the jugulum and entire sides are dark slate, very much darker than in the other specimens, only the centre of the abdomen being whitish. Some of the feathers of the breast show indistinct whitish shaft-streaks, while the entire under surface is pervaded by a greater or less amount of fuliginous wash. The entire upper parts are a perfectly uniform black, the other specimens having a decidedly slate-colored cast. The bill and feet of this specimen still retain their brilliant hue, the entire mandible and edges of the maxilla being an intense orange-red, while the legs and feet are a deep orange-yellow color. The collector's notes upon the label are as follows: "Iris white; bill orange-red, with upper mandible black; tarsi and feet orange-yellow".

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* The male is the example mentioned by Mr. Lawrence (Ann. Lyc. N. Y., ix, p. 90) as having been compared with Lafresnaye's type of the species, and found to differ in having the "centre of the breast and abdomen pale yellowish fulvous instead of white", and the bill mainly bright orange instead of yellowish white. Now, however, after a lapse of thirteen years, I find the same specimen with the abdomen white and the bill pale yellowish, showing that the difference was the result of fading of the older type specimen, as Mr. Lawrence himself suggested.

This specimen was obtained at Cuscua, La Palma, September 25, 1881, by Mr. Juan Cooper.

2. **Thryothorus hyperythrus** Salv. & Godm. (Biolog. Centr.-Am. Aves, i, p. 91).

A single specimen from Carrillos, Alajuela (October, 1879; Juan Cooper), agrees exactly with examples from Veragua and Panama.

3. **Troglodytes (?) ochraceus**, sp. nov.

Sp. ch.—Above bright tawny-brown, duller posteriorly, the forehead and lores more ochraceous; a very conspicuous superciliary stripe of bright ochraceous, most distinct posteriorly by reason of its strong contrast with a broad post-ocular stripe of dusky brown. Entire side of head (except as described), with whole lower parts, bright tawny-ochraceous, paler, but by no means inclining to white, on the throat and abdomen (the last deep buff). Remiges and wing-coverts narrowly barred or vermiculated with dusky, their inner webs uniformly of this color; tail dull brown, narrowly and irregulary barred, or vermiculated, with dusky. Crissum bright ochraceous-buff with a few rather indistinct bars of dusky. Lining of wing plain pale ochraceous; inner webs of remiges edged with grayish white. Wing, 1.80; tail, 1.25; culmen, .65; tarsus, .70; middle toe, .50. 3d, 4th, and 5th quills equal and longest; 2d equal to 7th; 1st much shorter than the secondaries (.60 shorter than longest primary). Tail graduated, lateral feather .25 or .30 shorter than middle pair; rectrices very narrow. Culmen regularly and very decidedly curved from the base.

Type, No. 85547, coll. U. S. Nat. Mus. Volcan de Irazú, Costa Rica, October 10, 1880; Juan Cooper.

This diminutive and very pretty Wren is very different both in proportions and coloration from any other species with which I am acquainted. In size it is about equal to *Anorthura troglodytes*, but it is otherwise not to be compared with that species, the bill being more curved than in any other member of the group that I have seen (except, perhaps, *Uropsila leucogastra*, of which the only specimen of which, that I have been able to examine, has the bill broken). It is with considerable doubt that I refer it to *Troglodytes* at all, and I do so only because I do not know where else to place it, while I am reluctant to institute a new genus for its special reception. Comparing it with specimens of typical *Troglodytes* (*T. aëdon*, *T. furvus*, *T. tesselatus*, *T. brunneicollis*, &c.), *Anorthura troglodytes*, and *Uropsila leucogastra*, I find that it agrees best with the latter in pattern of coloration and in general form, but the wing is much less rounded, the tarsi shorter, and the nostrils very different; those of *Uropsila* being (in the specimen before me) broadly oval, with very little membrane above them, while the present bird has a narrow, longitudinal or slit-like nostril overhung by a broad scale. I am inclined to believe, however, that extreme caution is necessary in using the shape of the nostril in dried skins as a generic character, since its external appearance is so easily modified by accidental circumstances attending the preparation of a specimen. For the present, therefore, I refer the species to *Troglodytes*, and leave further consideration of the question of its generic relationship in abeyance.

As to the coloration of this species, it is most like *T. brunneicollis*, but the tint which prevails over the entire lower parts and the greater part of the head in *T. ochraceus* is decidedly brighter and more yellowish than the light rufous color of *T. brunneicollis*, which, moreover, has this color restricted to the throat, jugulum, and breast. Furthermore, in *T. ochraceus* there is not the slightest indication of bars or other markings on the sides or flanks.

## Genus ACANTHIDOPS, nobis.

(Ἀκανθις, ίδος = *Acanthis*, and ὤψ = *facies*.)

GEN. CH.—Most nearly related to *Automolus*, *Placellodromus*, and allied genera in structure of the feet, &c., but very different in form of bill, and other characters. Bill about as long as the middle toe, cuneate in all its profiles, somewhat swollen basally, the culmen and lateral outlines decidedly concave in the middle portion; mandibular tomia very strongly inflexed, with a prominent angle near the base, anterior to which the edge is decidedly concave; maxillary tomia with a decided notch near the base, immediately above the mandibular angle; gonys very long (about equal to the exposed portion of the culmen); nostrils exposed, small, longitudinal, occupying less than the lower half of the nasal fossæ. Tarsus a little longer than the middle toe and claw, divided into about six plates, but these entirely fused on the outer side, except the lower one, which is distinct; lateral toes equal, the points of their claws falling short of the base of the middle claw; inner toe entirely separated at the base from the middle toe, and outer with only its first phalanx united; hallux about equal in length to the lateral toes, but much stronger, its claw decidedly larger than that of the middle toe.

Wings decidedly longer than the tail, very concave beneath, the 3d, 4th, and 5th quills nearly equal and longest, the 2d very little shorter, the 1st about equal to the 7th. Tail about equal to the wing measured to the ends of the secondaries, nearly even or very slightly rounded, consisting of twelve rectrices, which are acute but not stiffened at the points; the outer web of the *intermediæ* broader at the base than the inner web.

Type, *A. bairdi*, sp. nov.

This remarkable genus is so very distinct from any other hitherto described that it is quite difficult to decide where to place it. It evidently belongs, however, to the Synallaxine group, on account of the structure of the feet, but the bill is so widely different from that of any other member of the family ("*Dendrocolaptidæ*") as to suggest certain Fringilline forms, as *Carduelis* and *Chrysomitris*. In fact, the bill is so similar in form to that of the genera named that the collector had referred it to the latter genus.

As characters additional to those given in the above diagnosis, it may be stated that the bill is slightly notched near the tip; that the rictal bristles are so minute as to be hardly perceptible, and that the posterior face of the tarsus, on both sides, is entirely undivided, in which latter respect the present bird differs from *Synallaxis* and *Placellodromus*, but agrees with *Automolus*.

4. **Acanthidops bairdi**, sp. nov.

SP. CH.—♀ (*adult?*): Above dull olive-brown, the back washed with rusty; wings dusky, the middle and greater coverts tipped with pale rusty, forming two distinct bands, the inner secondaries broadly edged with darker rusty; remaining secondaries narrowly skirted with dark umber-brown, the primaries with light, dull ochraceous or yellowish olive. Tail dusky, the outer webs slightly greenish olivaceous. Pileum indistinctly streaked with dusky; sides of the head and neck dull olivaceous, lighter than the crown and nape; chin and throat still paler, the feathers pale ashy beneath the surface; rest of lower parts dull, light olivaceous, tinged with deeper olive across the breast and along the sides. Maxilla blackish, paler along the edge; mandible whitish; legs and feet light brownish (in dried skin); "iris pale blue." Wing, 2.50; tail, 2.20; culmen, .58; commissure, .65; tarsus, .80; middle toe, .60.

Type, No. 85549, coll. U. S. Nat. Mus., Volcan de Irazú, Costa Rica, Oct. 10, 1880; Juan Cooper.

5. **Nyctibus jamaicensis** (Gm.) Gosse.

Two very fine specimens, both females, from Sarchi, Alajuela (altitude 3,000 feet), August and September, 1881, agree with examples from Colombia and Eastern Peru, in rich dark colors. The two skins differ much in proportions, however, though evidently both adults; and after comparing with a considerable series of specimens from Jamaica, Mirador

(Eastern Mexico), Panama, Bogota, and Eastern Peru, I am unable to detect differences other than what appear to be chiefly of an individual character, though there is much variation both in size and colors among the different specimens.

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## DESCRIPTION OF A NEW FLY-CATCHER AND A SUPPOSED NEW PETREL FROM THE SANDWICH ISLANDS.

### By ROBERT RIDGWAY.

**Chasiempis sclateri**, sp. nov.

SP. CH.—Above dull ferruginous, more umber on the back, more rufescent on the rump and upper tail-coverts; sides of head and neck, chin, throat, and breast bright ochraceous-rufous; rest of lower parts pure white, the sides tinged with rufous; wings and tail dusky, the middle and greater coverts tipped with pale ferruginous, producing two distinct bands; secondaries edged with pale dull rusty; inner webs of rectrices (except middle pair) tipped with white, this about .40 of an inch wide on the lateral pair and decreasing in extent toward the inner feathers. Wing, 2.70; tail, 2.70–2.75; tarsus, .95–1.00; middle toe, .45.

Types, Nos. 41955 and 41956, coll. U. S. Nat. Mus., Waimea Kaui, Sandwich Islands; V. Knudsen.

Although I have been unable to compare the specimens described above with either *C. sandwichensis* (Gm.) or *C. dimidiata* (Hartl. & Finsch), I am satisfied, from reference to the descriptions of these in Sharpe's catalogue of the *Muscicapidæ* ("Catalogue of the Birds in the British Museum," vol. iv), pp. 231–233, that it is quite distinct specifically. The former is described as having the "wing-coverts black, tipped with white spots," the "under wing-coverts white," the cheeks and throat white, the tail only 2.15 inches in length, and the tarsus only .85 long; while the latter is still more different both in proportions and colorations.

**Cymochorea cryptoleucura**, sp. nov.

SP. CH.—*Adult:* Uniform fuliginous, the head and upper surface more slaty, the greater wing-coverts and outer webs of tertials paler, inclining to dull ash-gray; remiges and rectrices dull black, the latter (except middle pair) white at the base; upper tail-coverts white, *the longer feathers broadly tipped with blackish* (as in *Procellaria pelagica*); anal region mixed with white, and white of the upper coverts extending laterally to the sides of the crissum. Tail only slightly forked or emarginated, the outer feathers being only about .20–.30 of an inch longer than the middle pair. Bill, legs, and feet (including webs) deep black; wing, 5.80–6.30; tail, 3.00–3.15; bill (measured in straight line from base of culmen to point of the maxilla), .60; tarsus, .85–.90; middle toe, *with claw*, .85–.90.

*Hab.*—Waimea Kaui, Sandwich Islands (*V. Knudsen*). (Types, Nos. 41949 and 41950, coll. U. S. Nat. Mus.)

This fourth species of *Cymochorea* is very different from *C. leucorrhoa* (the only other having white on the tail-coverts), in several very important particulars, as follows: (1) The upper tail-coverts are pure white, terminated by a band of black .35–.50 of an inch wide; (2) the rectrices (except the middle pair) are distinctly white at the base, though this white is concealed by the coverts; (3) the greater wing-coverts and outer webs of the tertials are much darker, offering less decided contrast with the general color of the wings; (4) the tail is much less deeply forked, the depth of the fork not exceeding .30 of an inch, whereas in *C. leucorrhoa* it amounts to about .75 of an inch. In other respects the two species are much alike.

This bird is a true *Cymochorea*, having very prominent nasal tubes, the outer toe longer than the middle, the tarsus about equal to the middle toe (with claw), and the first primary shorter than the fourth as in the typical species of that genus.

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## DESCRIPTIONS OF THIRTY-THREE NEW SPECIES OF FISHES FROM MAZATLAN, MEXICO.

### By DAVID S. JORDAN and CHARLES H. GILBERT.

During the fall and winter of 1880–'81, Mr. Gilbert spent ten weeks at Mazatlan, on the west coast of Mexico, in making collections of fishes for the United States National Museum. One hundred and seventy species were obtained, of which the following appear to be new to science:

1. *Clupea stolifera.*
2. *Pristigaster lutipinnis.*
3. *Stolephorus ischanus.*
4. *Stolephorus lucidus.*
5. *Stolephorus exiguus.*
6. *Stolephorus curtus.*
7. *Stolephorus miarchus.*
8. *Synodus scituliceps.*
9. *Muræna pinta.*
10. *Muræna pintita.*
11. *Ophichthys xysturus.*
12. *Ophichthys zophochir.*
13. *Murænesox coniceps.*
14. *Atherinella eriarcha.*
15. *Caranx vinctus.*
16. *Serranus calopteryx.*
17. *Lutjanus colorado.*
18. *Lutjanus prieto.*
19. *Micropogon ectenes.*
20. *Sciæna icistia.*
21. *Scarus perrico.*
22. *Pomacanthus crescentalis.*
23. *Gobiesox zebra.*
24. *Gobiesox eos.*
25. *Gobiesox erythrops.*
26. *Gobiesox adustus.*
27. *Gobiosoma zosterurum.*
28. *Clinus zonifer.*
29. *Tripterygium carminale.*
30. *Salarias chiostictus.*
31. *Fierasfer arenicola.*
32. *Etropus crossotus.*
33. *Malthe elater.*

1. **Clupea stolifera**, sp. nov. (28125.)

Allied to *Clupea lile*, C. & V.

Body deep, much compressed; the dorsal outline with a slight curve; ventral outline more strongly arched; body deepest immediately before dorsal fin. Head short, preopercular margin subvertical; opercle but little oblique, evenly curved. Mouth very small, oblique; maxillary reaching to below front of pupil; lower jaw longer than the upper, which is scarcely emarginate; tip of lower jaw not reaching level of upper profile of snout. Both jaws with a few very small, weak, deciduous teeth; none on vomer or palatines; tongue with a very distinct linear patch. Gill-rakers slender and numerous, the longest about three-fifths diameter of orbit; about 29 on anterior limb of arch. Eye large, longer than snout and more than one-third length of head.

Dorsal fin inserted anteriorly, its origin nearer end of snout than base of caudal, by a distance equalling one-half length of head; the first long rays are much longer than base of fin, which is about three-fifths length of head. Anal fin short and low; distance of its origin from base of caudal equals height of body. Caudal scarcely longer than head, the lower lobe longer than the upper. Pectorals reaching two-thirds distance to root of ventrals, 1⅓ in head. Ventrals inserted nearly under first dorsal ray, their length 1⅔ in head.

Scales smooth, firm, closely adherent, their edges entire; a very narrow sheath of scales along bases of dorsal and anal fins; caudal fin scaled for one-half its length. Ventral scutes very strongly developed, running from thorax to front of anal, the posterior with strong spines; 17 in front of ventral fins, 12 behind them.

Head, 4¾ in length to base of caudal; depth, 3⅓. D. 14; A. 16; L. lat. 40; L. transv. 11.

Color translucent; sides with silvery luster; each scale on back with marginal half black-punctate; a dark line along median line of back, becoming distinctly blackish on tail; snout greenish above, its tip and the end of the lower jaw dusky; a very bright, well-defined, silvery band along sides (as in *Atherina* and *Stolephorus*), margined above with a narrow bluish line; this band is constantly widest at middle of body, tapering slightly towards head and caudal peduncle, abruptly expanding at the end of the latter and covering nearly the entire breadth of the end of the tail. The width of this band is just the depth of one scale, a little more than the depth of the pupil. Dorsal and caudal fins light yellowish-green, the tips of anterior rays of dorsal and of upper and lower caudal lobes usually jet-black. The base of each anal ray marked by black dots. Paired fins immaculate.

Many specimens of this beautiful, well-marked species were obtained at Mazatlan, where it is very common. It does not reach a greater length than 5 or 6 inches, and usually escapes through the coarse meshes of the fishermen's seines.

The numerous types of *C. stolifera* are numbered 28125 on the register of the National Museum.

### 2. **Pristigaster lutipinnis**, sp. nov. (28126, 28209, 28320.)

Body elongate, very strongly compressed, especially towards ventral outline; profile nearly straight from origin of dorsal to occiput, where it forms a slight angle; head small, its upper outline but little descending, the lower rapidly rising. Mouth large, very oblique, the lower jaw longest, its tip almost entering upper profile of head; maxillary reaching to or slightly beyond vertical from anterior margin of pupil, its length a little more than half head. Teeth large, in a single series in each jaw; in the upper jaw numerous and comparatively close-set, in the lower few and distant, but considerably larger; margin of maxillary with minute, close-set teeth; palatines and pterygoids toothed, vomer smooth. Eye very large, much longer than snout, and more than one-third length of head. Gill-rakers not longer than pupil, about 18 in number; pseudobranchiæ developed.

Dorsal small, posterior, its origin constantly slightly nearer base of caudal than occiput. Pectorals long, not nearly reaching vent, slightly shorter than head. Anal shorter than in other species, its origin midway between middle of caudal base and front of eye, its base contained 2⅔ in body; anterior anal rays highest, a little longer than eye. Lower caudal lobe longest.

Scales thin, very readily deciduous; ventral scutes very strong, running from throat to origin of anal fin. D. 13; A. 53; L. lat. 44; L. tr. about 11; ventral scutes, 29; head, 4½ in length; depth, 3½.

Color: Greenish-olive above, on sides silvery with a tinge of yellow; a small black spot on upper angle of preopercle, and a larger very distinct black humeral spot; a black line along dorsal ridge; end of snout and tip of lower jaw black. Anal and caudal golden yellow on basal portions, the tips transparent, dotted with black; pectorals and dorsal with a yellow blotch on middle of first rays, sometimes largely yellow.

This species is rare at Mazatlan and but few specimens were obtained. It is very closely related to *P. macrops* and *P. dovii*, differing from them chiefly in the fewer rays and backward position of the anal fin. The types are about 6 inches long and are numbered 28126, 28209, and 28320 in the United States National Museum.

### 3. **Stolephorus ischanus**, sp. nov. (28246.)

Closely related to *Stolephorus browni*.

Body elongate, little compressed and scarcely elevated, nearly as high at nape as at front of dorsal; belly compressed, its edge usually rounded. Head long and slender, its height at occiput but little greater than half its length; opercular margin very oblique, forming a more or less evident angle at junction with subopercle; cheeks triangular, moderately broad; opercle short. Maxillary slender, tapering to a blunt point, not quite reaching opercular margin; teeth small, evident for entire length of both jaws, those near symphysis of lower jaw slightly enlarged. Gill-rakers numerous, of moderate length, the longest about two-thirds diameter of orbit. Snout long, about three-fourths length of orbit, which is large and contained three and three-fourths times in length of head. Dorsal fin with upper margin straight, the posterior rays not prolonged; origin of dorsal about equidistant from base of median caudal rays and front of orbit. Origin of anal under base of posterior dorsal rays, midway between front of orbit and tip of caudal; its base very short, less than two-thirds length of head. Caudal very short, much less than length of head, the lower lobe the longest. Pectorals broad and short, not nearly reaching base of ventrals, which reach about one-half distance to front of anal. Scales thin, moderately deciduous.

Head, 3¾ in length; depth, 5; eye, 3½ in head. D. 13; A. 16; Lat. l. 39 + 2; L. tr. 7.

Color: Translucent, with silvery luster; a sharply-defined, bright silvery band on sides, broadest opposite middle or end of anal, and tapering each way; the streak is confined to a single series of scales (being distinctly narrower than in *S. browni*); sides of head bright silvery; top of head blackish above orbits; two large, well-defined clusters of black dots behind occiput, one on each side of median line; between dorsal and occiput from one to three series of scales black margined; behind dorsal the median series only thus margined. Median line of back with a black streak the entire length; tip of snout, median line of head anteriorly, and region behind orbits black-specked.

This species is very common in the harbor at Mazatlan, reaching a length of 2½ to 3 inches. The types are numbered 29246 U. S. Nat. Mus. This is apparently the species recorded by Steindachner from the west coast of Mexico as *Engraulis browni*. The latter species has a deeper body, distinctly broader silvery stripe, and a larger number (19–20) of rays in the anal fin.

4. **Stolephorus lucidus**, sp. nov. (28121.)

Body closely compressed but not greatly elevated, the dorsal outline with a very weak arch; belly more curved, carinate in front of anal fin, but not serrate. Head short, rather pointed, the margin of opercle and subopercle forming an even curve which is but little oblique.

Maxillary narrow, pointed, reaching to or slightly beyond mandibular joint, but not to gill-opening; teeth very evident along entire length of maxillary and mandible, becoming larger towards symphysis of lower jaw; snout short, projecting, about one-half diameter of orbit, which is about one-third length of head; cheeks oblique, V-shaped, the length more than half head; opercle moderate; gill-rakers not very numerous and rather short, the longest not more than one-half diameter of orbit.

Origin of dorsal fin midway between base of middle rays of caudal and front of orbit; upper margin of dorsal straight, the last rays not prolonged. Dorsal much higher than long, its base equaling about one-half head. Origin of anal under middle of dorsal, its base a little longer than head. Caudal short, the lower lobe longer than the upper; the median rays about one-third the longest. Pectorals three-fifths length of head, nearly or quite reaching base of ventrals, which are short and do not reach the vent. Scales moderately adherent; dorsal sheath very low; that of anal fin higher.

D. 12; A. 27; Lat. l. 36 + 2; L. transv. 6. Depth, $3\frac{3}{4}$ in body; head, $3\frac{4}{5}$; eye, 3 in head; B. 11–12.

Color: Body translucent; scales with a silvery luster; dorsal region much punctate with black and with some yellow speckling which broadly covers the margins of the scales; a distinct dark median line, composed of minute dark specks, along entire length of back; sides with a rather diffuse silvery band, broadest anteriorly, becoming very narrow on caudal peduncle, then expanding to base of fin; it covers less than one row of scales, and is narrower than diameter of orbit; top of head, symphysis of lower jaw, and snout, with much black speckling, the snout yellowish; anal fin thickly speckled at base; anterior rays of dorsal and anal, and lower rays of caudal, with some faint greenish-yellow and more or less black dotting; tip of caudal blackish, more distinctly so at end of lobes.

Common in the harbor of Mazatlan and called *Sardina* in common with the other species of this genus, and *Clupea stolifera*. It reaches a length of 4 to 5 inches. The many types are numbered 28121 in the United States National Museum.

### 5. **Stolephorus exiguus**, sp. nov. (28120.)

Allied to *S. curtus*, but with much slenderer body and shorter anal fin.

Body not greatly compressed and not elevated; belly compressed, subcarinate, serrulate; head rather short, its height at nape more than two-thirds its length; opercular margin not much oblique; cheek narrowly triangular; snout longer than two-thirds diameter of orbit; eye large, three and one-fourth in head; maxillary tapering to an acute point, reaching to or nearly to opercular margin; teeth present in both jaws; in the lower minute and developed on anterior half only; in upper jaw small, but easily perceptible. Gill-rakers short, the longest not more than one-half diameter of orbit.

Origin of dorsal fin midway between base of median caudal rays and middle of pupil; base of fin but little more than one-half length of head. Origin of anal under anterior third of dorsal fin; its base about four-fifths length of head. Caudal short, not nearly equaling length of head. Pectorals not nearly reaching ventrals.

Scales very deciduous.

D. 12; A. 17; L. lat. 38; L. transv. 5. Head, $3\frac{3}{4}$ in length; depth, 5.

Color translucent; scales with silvery luster; a faint silvery streak along sides, widest and most distinct posteriorly, becoming faint anteriorly, and usually disappearing before reaching head. Scales on back with dotted margins, no median dark line on back; sides of head bright silvery; top of head dusky posteriorly; caudal and dorsal fins dotted with black, these dots forming two faint blotches at base of caudal; a series of black dots between anal and caudal fins.

About 10 specimens were obtained in the Astillero at Mazatlan, the largest 2½ inches long. It is apparently less abundant than the other species of this genus in company with which it is found.

The types are numbered 28120 on the register of the National Museum.

6. **Stolephorus curtus**, sp. nov. (29242.)

Body more compressed and elevated than in *S. ischanus;* dorsal outline nearly straight, the ventral scarcely curved except anteriorly; caudal peduncle deep; belly in front of ventral fins sharply compressed, carinate and serrulate. Head short and high, its depth at occiput seven-tenths its length; snout blunt, not much produced; tip of lower jaw in front of eye; maxillary tapering to a sharp point, which usually does not quite reach gill-opening; both jaws with very minute teeth, perceptible towards symphysis of lower jaw, but not laterally. Opercle shortish; cheeks broadly triangular. Gill-rakers on upper limb longest, about two-thirds diameter of orbit. Eye large, contained 2¾ to 3¼ times in length of head.

Origin of dorsal fin midway between base of middle rays of caudal and middle of pupil; the fin short and rather high, its base but little more than one-half length of head; the last rays not produced. Origin of anal fin under middle or anterior third of base of dorsal; the base of the fin moderate, varying from nearly as long as, to a little longer than, head. Caudal short, less than length of head; the lower lobe longest; the fin moderately forked; the middle rays about two-fifths the length of the longest. Pectorals very short and rounded, variable in length, but usually not reaching base of ventrals. Scales thin, caducous.

D. 11 or 12; A. 22 or 23; L. lat. 35; L. transv. 5. Head, 4⅕ in length; depth, 4⅔.

Color translucent; sides with a silvery luster; top of head dusky; sides of head and a faint streak along sides of body with silvery pigment; the streak is somewhat indistinct, especially forwards, where it often disappears; basal half of dorsal fin punctate with black and yellow dots; a double series of these dots along base of fin, running back to base of caudal; caudal not black margined; base of anal thickly punctate, a series of dots usually extending back to caudal fin; paired fins immaculate; tip of snout yellowish, without black specks; no dark line in front of dorsal fin.

Many specimens 2½ inches long were obtained at Mazatlan, where it is common in the muddy waters of the Astillero. The types are numbered 29242 on the register of the National Museum.

7. **Stolephorus miarchus**, sp. nov. (28119.)

A slender species, distinguished by the very small anal fin. Known to us from immature specimens only.

Body very slender, not strongly compressed (perhaps becoming deeper with age); belly not trenchant. Snout sub-conic, compressed. Teeth rather large, distinct in both jaws; maxillary reaching to edge of preopercle. Lower jaw much overlapped by the snout, its tip extending little in front of the eye, which is not especially large.

Insertion of dorsal fin midway between snout and caudal; anal fin extremely short, its first ray inserted under last of dorsal, the length of its base less than that of the caudal peduncle behind it. Scales lost.

Color perfectly translucent in life, with a diffuse silvery lateral shade, but no distinct stripe; clusters of dark points on occiput; base of caudal with dark markings above and below formed of dark points; the entire fin speckled; a small black streak on each side of ventrals; black points at the base of each fin ray.

Head, 4⅕ in length; depth, 6.

Dorsal with about 12 rays (11 to 13); anal, 12 to 14.

This species is known to us from eight specimens (28119 U. S. Nat. Mus.), the largest 1¾ inches in length, killed by dynamite cartridges in deep water in the harbor of Mazatlan, where they were exceedingly abundant. They are, of course, immature, but the species to which they belong will be known from all others by the short anal.

8. **Synodus scituliceps**, sp. nov. (28392, 29449.)

Allied to *S. fœtens* L., but with a much smaller head.

Body slender, subterete, less depressed than in *S. fœtens*. Head very short and slender, its length above not greater than greatest depth of body. Snout pointed, triangular, about as broad as long. Interorbital space slightly concave, about as broad as eye; a longitudinal ridge on each side of its middle, which sends out radiating branches opposite posterior part of eye; preopercle somewhat raised above eye, its margin somewhat serrate; maxillary extending much beyond orbit, its length 1⅗ in head; lower jaw a trifle shorter than upper, its symphyseal knob scarcely included. Teeth essentially as in *S. fœtens*, the bands, perhaps, a little narrower; palatine teeth forming a very narrow band, which becomes posteriorly a single series. Gill-rakers undeveloped. Branchiostegals, 14. Cheeks with four rows of large scales; opercles with four.

Distance from origin of dorsal fin to adipose fin equal to the distance from the former to the middle of orbit; origin of dorsal nearer to end of snout than to base of caudal by a distance equal to ⅖ head.

Dorsal fin much higher than long, the first and last rays coterminous when the fin is deflexed. Caudal well forked, the upper lobe the longer, 1⅓ in head; the middle rays scarcely more than one-third the length of the outer. Ventral fins long and pointed, their length scarcely more than half the distance from their base to front of anal, 1⅐ in head.

Pectorals short, their length just about half head, equal to length of snout and eye.

Scales comparatively large; 5 series between lateral line and ventrals; 4 between adipose fin and lateral line. Scales of breast little reduced; 11 between the bases of the two pectorals.

Head, 4⅖ in length (4 in *S. fœtens*), 5⅙ including caudal; greatest depth, 6⅔. D. 11; A. 13. Scales, 6–61–6.

Color in life, brownish-olive above, white below; each scale of back with one or more paler flecks; top and sides of head marbled; lower jaw sometimes marked with darker. Pectorals and caudal mostly blackish; adipose fin black, with a pale border; ventrals and anal immaculate. No yellow in life.

Two specimens of this species were obtained, one 7½ inches long (28392) from the harbor of Mazatlan, the other 7 inches long (29449) from Panama. The species is much like the *S. fœtens* of the Atlantic Coast, but may be readily known by the small head and the somewhat larger scales. *Synodus fœtens* has been recorded from Panama, by Dr. Günther, but the reference is probably to *S. scituliceps*.

9. **Muræna pinta**, sp. nov. (28238, 28177, 28388, 28197, 29608, 29359.)

Allied to *Muræna lentiginosa* Jenyns.

Body rather stout and compressed. Teeth all comparatively small, subequal, everywhere uniserial; those of the vomer developed only posteriorly and smaller than the others. Two anterior teeth of mandible larger than the other teeth, but hardly canine-like. Lateral teeth of both jaws rather narrow, sharp, directed a little backwards, those of lower jaw smallest. Mouth not closing completely. Jaws about equal. Anterior nostril with the tube two-thirds diameter of eye; tube of posterior nostrils nearly as long as pupil. Cleft of mouth 2⅗ in head. Gill-opening longer than eye. Eye 2⅓ in snout, a little nearer tip of snout than angle of mouth. Head 2⅖ in trunk. Tail a very little longer than rest of body. Dorsal well elevated, beginning in front of gill-opening.

Color rather dark olivaceous-brown above, belly slightly paler, everywhere covered with round or horizontally-oblong light yellow spots, each surrounded by a wide black border. On the body these spots are placed with some regularity; the larger ones, which are a little larger than the pupil, are arranged in 5 or 6 horizontal rows, those of each row being connected by dark streaks two-thirds as wide as their diameter; between the larger streaks are numerous small ones, some of them mere points; all except the very smallest are surrounded by darker rings, and none are indistinct or confluent. The spots are rather larger and brighter and more crowded on the belly than on the back, where the ground color occupies more of the surface than the spots; towards the head the spots become closer together and rather smaller, and on the anterior and lower parts of the head the ground color is reduced to mere reticulations around the spots. Space about gill-opening dusky

Fins colored like the region to which they belong; the dorsal anteriorly with a median row of oblong spots.

The specimen described (No. 28238 U. S. Nat. Mus.) is 18 inches long.

This species is very abundant among the rocks in the harbor of Mazatlan, where numerous specimens were obtained. It is known to the Mexican fishermen as *Anguila pinta.* (From the Latin *puncta*, *i. e.*, punctate.) Another specimen (29359) was obtained by Lieutenant Nichols at San Josef Island.

### 10. **Muræna pintita**, sp. nov. (28311 U. S. Nat. Mus.)

Subgenus *Gymnothorax;* allied to *Muræna dovii* Günther, but differing in color and proportions.

Tail longer than body, by about two-thirds the length of the head; distance from snout to anterior edge of gill-opening contained 2⅗ times in length of trunk. Eye above middle of cleft of mouth; diameter of orbit slightly less than half length of snout. Cleft of mouth rather more than two-fifths length of head. Teeth all uniserial; those in sides of lower jaw small, compressed, directed backward, of nearly equal size, some of the posterior larger than the anterior; front of lower jaw with 4 to 6 moderate, movable canines. Sides of upper jaw with some fixed canines among the smaller teeth; premaxillaries with two rather small movable canines; four small conical teeth in front. Vomer with two large movable canines, distant from each other, the posterior the larger. Mouth capable of being nearly closed.

Tubes of anterior nostrils short, scarcely equaling half the diameter of orbit. Posterior nostrils without tubes. Gill-slit one-third wider than orbit. Dorsal fin beginning much in front of gill-slit.

Coloration: Chestnut-brown; upper parts of body and tail with numerous yellow non-ocellated dots, the largest much smaller than pupil, most of them being minute dots. Dorsal colored like the back. Anal plain brown, becoming darker posteriorly. Head without spots; longitudinal furrows under throat, black.

A single example, 19 inches in length, was taken among the rocks near Mazatlan; the species is called *Anguila pintita* by the fishermen.

### 11. **Ophichthys xysturus**, sp. nov. (28142, 28247, 29642.)

Subgenus *Pisodontophis;* allied to *O. maculosus* (Cuv.).

Teeth all more or less blunt and granular; a band of three or four series, on each side of lower jaw; a band of two rows, on each side of upper jaw; vomer with a long series divided into two for about half its length. Anterior nasal tubes conspicuous, turned downward. Eye 2½ in snout; front of eye above middle of gape, the length of which is a little more than one-third of head; the angle of mouth well behind eye. Interorbital width about ⅔ length of the rather long and slender snout, which projects much beyond lower jaw, the tip of the latter about reaching middle of snout.

Length of head contained 4¼ times in that of the trunk; head and trunk together shorter than tail, and contained 2⅓ to 2½ times in total length. Pectoral very small, its length about equal to depth of gill-opening. Dorsal beginning close behind nape, much in front of gill-opening; fins low; tail pointed, the tip sharp.

Color light olive; sides each with three series of large round brown spots, those of the two upper series of equal size, those of lower scarcely half as large, faint, and often obsolete anteriorly; the spots irregular in their arrangement, those of the upper series usually twice as numerous as those of the next; those of the upper series along base of dorsal fin extending partly on the base of the fin; lower series of spots along base of anal, some of them extending on the fin or even entirely upon it; on the belly are sometimes small dark spots scarcely arranged in series. Dorsal fin with a terminal series of dark spots, which are partly confluent, the fin narrowly margined with white. Anal reddish, with a lighter margin. Pectoral with a blackish blotch. Head covered with round black spots, which become smaller and more numerous towards the snout. Lower jaw with dark spots. Iris light yellow.

Several specimens, from 1 to 2 feet in length, were obtained.

12. **Ophichthys zophochir**, sp. nov. (28280, 28277, 29220, 29239.)

Allied to *Ophichthys parilis* (Richardson) Günther.

Cleft of mouth wide, the snout much overlapping the lower jaw; length of gape from tip of snout to angle of mouth contained 2⅔ times in length of head. Teeth small, sharp, subequal, in two somewhat irregular rows on each of the dentigerous bones; points of the teeth directed backwards; no canines; patch of vomerine teeth long, the two series converging backwards. Eye large, its diameter two-thirds the interorbital width, which is slightly less than length of snout. Anterior pair of nostrils at end of anterior third of snout, in a short tube, which is less than one-third diameter of orbit and widened at tip. Posterior nostrils large, below the anterior margin of the orbit, not tubular, but the margin with free dermal flaps.

Gill-opening one-third wider than eye, its upper edge slightly above middle of base of pectoral; length of slits slightly greater than the isthmus between them.

Tail long, very nearly twice as long as rest of body. Length of head contained 2½ times in that of trunk.

Pectoral fin well developed, its length 2½ in length of head, in adults; proportionally longer in the young. Dorsal fin beginning slightly in advance of tip of pectorals, well developed, the rays distinct. Tip of tail finless, moderately acute.

Color olive brown, becoming paler on sides, whitish below; snout and mandible blackish, yellowish brown anteriorly; mandible with a series of black pores below; throat yellowish, the color extending up on the opercles. Pectoral blackish, its base pale. Anal with the distal half black. Dorsal with a broad black margin. Length about two feet.

This species is rather common in the rocks about Mazatlan, where it is known to the fishermen as "*Anguila blanca.*" Several specimens are in the collection.

13. **Muræenesox coniceps**, sp. nov. (28136, 28141, 28212.)

Body compressed, stoutish, head twice in length of trunk. Snout slender, conical, rather pointed, nearly half longer than broad at front of eyes, the distance between anterior nostrils less than half its length; cleft of mouth from tip of snout 2½ in length of head; upper jaw projecting beyond the lower; teeth all erect, not very large or sharp and without evident basal lobes; teeth in jaws small, compressed, blunt, triserial, those in the inner series much the largest; teeth in outer series very small and blunt; teeth in front of jaws largest, sharp, forming small canines which are shorter than the pupil; about 23 large teeth in each side of lower jaw; middle series of vomerine teeth compressed, without basal lobes, about ten in number; the outer teeth blunt, much smaller. Both nostrils without tubes, the anterior with a narrow free rim. Eye large, 2 in snout, 1½ in interorbital width, its front much nearer angle of mouth than tip of snout; anterior nostril nearer tip of snout. Gill-opening beginning below upper edge of pectoral, its length greater than the distance between the two openings. Dorsal beginning above gill-opening; moderately high, its longest rays equal to length of eye and snout. Tail about one-third longer than head and body. Pectorals nearly as long as head, a little longer than cleft of mouth from tip of upper jaw. Lateral line very distinct.

Clear olive brown above, dull whitish below with olive tint; dorsal olive brown; anal dusky; both fins with a black margin becoming wider posteriorly; the caudal nearly uniform black; pectorals black, light olive at base; iris grayish silvery.

This species is not very common among the rocks in Mazatlan Harbor, and is not distinguished by the fishermen by any peculiar name. It reaches a length of three feet, and, in common with the other species at Mazatlan, is occasionally eaten but not highly valued. The specimen here described (No. 28136 U. S. Nat. Mus.) is about 2 feet long. This species was also obtained at Panama.

14. **Atherinella eriarcha**, sp. nov. (29243.)

Body comparatively deep, deepest at base of pectorals, strongly compressed. Head short, less compressed than the body, the snout very short, blunt, and rounded in profile; maxillary very slender, almost reaching the vertical from anterior margin of pupil; cleft of mouth oblique, curved, the lower jaw included. Eye very large, 2⅛ in head in the type specimen. Premaxillaries very protractile, narrow. Teeth in a narrow band in each jaw, rather strong, recurved; none on vomer or palatines. Gill-rakers long and slender.

First dorsal very short, its origin slightly behind origin of anal; of three very slender weak spines. Space between first and second dorsal three-fifths length of head. Second dorsal beginning over middle of anal, terminating slightly in advance of its last ray; the first rays highest. Origin of anal considerably nearer snout than base of caudal. Base of anal oblique, the anterior rays much highest, the posterior very short. Caudal deeply forked. Ventrals short, not reaching front of anal. Pectorals very broad and short, slightly falcate, scarcely longer than distance from snout to posterior margin of pupil.

Scales adherent, with entire edges.

Color transparent, with a wide, very sharply-defined, silvery band along sides, margined above by a narrow dark line; this band abruptly constricted near the middle of the caudal peduncle and again widened at base of tail into a silvery blotch without dark edging; opercles and branchiostegals silvery; lips punctulate with black dots; silvery peritoneum showing through walls of abdomen; caudal dusted with black; a black point at base of each dorsal and anal ray.

Head, 4 in length; depth, 4⅓.

D. III–I, 12; A. I, 27; Lat. l. 36; L. trans. 7.

We refer this species to the genus *Atherinella* of Steindachner, without raising the question of the distinction of the latter group from *Atherina* proper. *Atherinella eriarcha* is known to us from a single young specimen (No. 29243 U. S. Nat. Mus.), 2⅛ inches in length, found in a rock pool at Mazatlan. It is distinguished from *A. panamensis* Steind. by numerous characters, notably the much longer anal and shorter pectoral fins.

15. **Caranx vinctus**, sp. nov. (28365, 28366.)

Allied to *C. cibi* Poey.

Body elongate, elliptical, compressed, upper profile evenly arched from snout to caudal peduncle, the lower nearly rectilinear from snout to origin of anal fin; upper profile slightly carinate anteriorly. Width of cheek about equal to diameter of eye. Mouth moderately oblique, the jaws subequal, the lower scarcely included; intermaxillaries anteriorly about on a level with axis of body, just below level of lower margin of eye; maxillary reaching vertical from front of orbit, 3 in head; teeth very small, blunt, in a narrow band in each jaw, becoming a single series in sides of mandible; the outer series slightly enlarged; teeth on vomer, palatines, and tongue similar to those on jaws. Gill-rakers very long, numerous; the longest, two-thirds diameter of orbit, their number about 10–27. Eye large, less than length of snout, about equaling interorbital width, 4 in head. Adipose eyelid moderately developed. Preopercle with its posterior margin very oblique, the angle broadly rounded. Preorbital thin, its least width three-fifths diameter of orbit.

Spinous dorsal well developed, the spines high and flexible; the antrorse spine well developed; the fourth spine the longest, the fifth but little shorter; those posterior rapidly decreasing; the fourth spine equals two-fifths length of head; length of longest dorsal ray less than one-half length of head. Anal spines strong; the soft rays a little lower than those of dorsal. Soft dorsal and anal entirely received within a membranaceous scaly sheath, which is two-fifths the height of the median dorsal rays, and terminates before the ends of the fins, leaving the last two rays free; the two fins not falcate, the rays regularly decreased from the first. Pectorals very long, falcate, reaching much beyond the origin of the anal, and to the twelfth lateral scute; the fins one-third length of body. Ventrals reaching to or slightly beyond the vent, which is nearly equidistant from their inner axil and from second anal spine. Caudal lobes not falcate, the upper slightly the longer, a little less than length of head.

Lateral line with a strong curve anteriorly, the width of which is less than one-half the straight portion; the depth of the curve about one-fourth its width. Plates very strongly developed, extending the whole length of straight portion of lateral line, which begins under first dorsal rays. Top of head, opercles, jaws, and preorbital scaleless or with a very few scattering scales; cheeks scaly, breast entirely covered with fine scales; membrane of caudal fin with series of scales.

D. VIII-I, 24; A. II-I, 19; Lat. l. 48. Head 3½; depth 3.

Color dusky-bluish above, silvery below, with golden and greenish reflections; eight or nine vertical dark half-bars descend from back to below lateral line, the widest about equaling diameter of orbit, and more than twice as wide as the light interspaces; breast blackish; head dusky; end of snout black; a distinct black blotch on upper angle of opercle. Fins somewhat dusky; pectoral without spot; anal white at tip.

Common at Mazatlan, but not one of the most abundant fishes. Numerous specimens are in the collection.

16. **Serranus calopteryx**, sp. nov. (28123.)

Allied to *Serranus scriba* (L.), but with shorter soft dorsal.

Body elliptical, little elevated, the dorsal outline gently arched. Snout sharp; lower jaw distinctly longest; maxillary reaching vertical from middle of pupil, or beyond; interorbital space somewhat concave and ridged. Teeth small, cardiform, two small canines in front of lower jaw; four in front of upper jaw; the inner series of teeth somewhat enlarged, containing 2 or 3 large fixed canines in the middle of sides of lower jaw, these larger than the canines in front. Strong teeth on vomer and palatines. No supplemental maxillary bone. Gill-rakers short, few in number, about 8 in all. Preopercle nearly evenly rounded, the posterior margin nearly vertical and, as well as the angle, very finely, evenly, and sharply serrated, the serræ on angle scarcely larger; the lower limb nearly entire. Opercle ending in three compressed spines, the middle the largest, the membrane extending much beyond them.

Scales well ctenoid, on cheeks small, in about 11 rows; opercles with about 4 series of large scales; jaws and top of head naked.

Spinous dorsal low, not notched, the first two spines shorter than the others, which are of equal length and shorter than the soft rays; length of spines about equaling distance from snout to middle of eye, 3 in head. Soft dorsal elevated, the anterior rays somewhat shorter than the posterior, the tips of which reach rudimentary caudal rays, 2⅕ in head. Anal spines short and strong, the middle one stronger and slightly longer than the third; the second about equal to dorsal spines; anal rays more elevated than those of dorsal, the last ray the longest and about equal to two-thirds length of head. Ventrals reaching vent; pectorals slightly beyond it, two-thirds length of head; ventrals inserted in front of axil of pectorals. Caudal short, somewhat lunate, with the outer rays produced; the fin 1⅖ in head. Dorsal and anal scaleless.

Head 2⅘ in length; depth 3⅓. D. X, 12; A. III, 7; scales 5–50–15.

Color: Body light olivaceous, the dorsal region with about 12 broad dark brown cross-bands extending from back to below lateral line, where they are interrupted, to reappear on the level of base of pectorals as a series of roundish blotches; those in front pinkish, behind brown. A light streak from nape to front of dorsal, with two parallel ones (usually indistinct) on each side of it. The brown bar immediately behind soft dorsal is replaced by the ground color, but the corresponding brown spot on sides is present. A brownish streak from snout through eye to upper angle of opercle, clear brown anteriorly; suborbital light blue, with a narrow median streak of clear brown; numerous clear brown blotches on top of head. Base and axil of pectorals largely pink, the fin very finely barred (vermiculated) with pink and light blue. Dorsals reddish, with a median light streak, which disappears posteriorly on soft dorsal; distal part of soft dorsal with numerous small dark brown spots, becoming light pink posteriorly and alternating with similar spots of whitish or light blue. A dark brown spot at base of ventrals; one below base of pectorals, and one in front of the latter at margin of gill-opening. Caudal brown at base and on outer rays, pink on inner rays, vermiculated with irregular narrow light blue lines. Anal and ventrals light glaucous blue, thickly marked with brownish-yellow spots.

Five or six specimens of this species were taken in a seine in the Astillero (estuary), at Mazatlan.

17. **Lutjanus colorado**, sp. nov. (28386, 28305, 28261, 28383.)

Body comparatively deep, highest at front of spinous dorsal, and with an angle at origin of soft dorsal. Profile of back evenly arched to origin of dorsal fin; ventral outline rectilinear to origin of anal fin, the base of which fin is very oblique in the young, less so in the adult.

Snout rather short, less acute than in *L. prieto*, less than one-third length of head. Maxillary reaching nearly or quite to vertical from front of pupil, 2¾ in head. Width of cheek from orbit to angle of preopercle less than snout. Eye, in adult, half the interorbital width and two-fifths length of snout, proportionately larger in the young. Vertical margin of preopercle with minute, even, serrations for its entire length. A shallow emargination above the angle, which is provided with coarser, but still inconspicuous, serrations; lower limb of preopercle smooth on its anterior half.

Upper jaw with a very narrow band of villiform teeth, behind the conical teeth, which are not very large. A single pair, or more usually two unequal pairs, of canines in front of upper jaw, between which is a pair of small teeth. Conical teeth in lower jaw larger than those of upper, close-set, largest in the middle of the jaw, becoming smaller in front and behind; about 8 on each side. Vomerine teeth arranged in a crescent-shaped patch, without backward extension on the median line. Teeth on tongue in two patches, a roundish one anteriorly, usually formed by the junction of three smaller ones, and an oblong patch on the median line behind this.

Gill-rakers distant, few, the longest half length of orbit, their number about 1+7.

Dorsal spines strong, the fourth the longest, the last more than half its length; the fourth spine 2¾ in head, as long as the snout in the adult, a little longer in young. Soft dorsal and anal similar to each other, some of the posterior rays of each being considerably elevated, the fin thus being pointed instead of rounded in outline. In the young these rays are much longer than the dorsal spines and slightly longer than the caudal peduncle. In the adult they are lower but still longer than the dorsal spines. Longest rays of anal about half head.

Caudal not deeply emarginate. Pectorals long, acute, reaching to or beyond vent, 1⅕ in head. Ventrals not nearly reaching vent, as long as snout and orbit. Anal spines strong, the second rather longer than third and a little stronger, 3⅓ in head.

Scales rather small, the series forming an angle at the lateral line, those below it running the more obliquely, those above lateral line forming nearly horizontal series, parallel with the lateral line. Scales on cheeks in about 7 rows, one row on subopercle and about 7 on opercle. Scales on breast very small, much smaller than those on opercles. Soft rays of vertical fins with accompanying series of scales.

Head 2¾ times in length; depth 3. D. X, 14; A. III, 7; scales 5–47–11; tubes in lateral line 47.

Coloration in life: Above dark olivaceous, each scale with the basal half dark olive brown; sides with or without some silvery luster at bases of scales, forming when present faint longitudinal streaks; head and lower parts of body bright red, especially bright on lower parts of head, the color extending up on the sides for a varying distance; upper jaw and maxillary reddish; upper parts of head dark olivaceous; scales on sides of head without dark spots; a much interrupted light blue line from middle of preorbital along suborbital, rarely extending behind the orbit, much less distinct than in *L. argentivittatus*, and disappearing in alcohol; cheeks sometimes with bluish spots or lines; inside of mouth red; vertical fins very dark, with more or less reddish; spinous dorsal with a broad median streak of very light slaty blue; pectorals and ventrals reddish, the latter with dusky.

This species is a very abundant food-fish at Mazatlan, being seen daily in the markets. It is preferred (probably on account of its bright colors) as a market fish to the other species of *Lutjanus*. It reaches a weight of about 15 pounds, and is known to the Mexican fishermen as "*Pargo Colorado.*"

18. **Lutjanus prieto, sp. nov.** (28196, 28231, 28253, 28384, 29567, 28779, 29787.)

Body comparatively elongate, the back little elevated; profile very gently curved; snout long and pointed, one-third length of head; eye small, less than breadth of the wide preorbital; maxillary barely reaching to opposite front of orbit, its length 2⅗ in head; each jaw with a very narrow band of villiform teeth, outside of which is a single series of larger teeth; those in sides of upper jaw small; two in front, however, developed as large fang-like canines, larger than usual in this genus, their length about equal to the diameter of the pupil; a pair of smaller canines near the middle of the upper jaw, between the large ones; conical teeth of lower jaw distant, canine-like, 6 to 8 in number on each side, larger than in any of our other species of *Lutjanus*, much larger than those on sides of upper jaw; teeth on tongue in a large oval patch, in front of which are two smaller patches; teeth on vomer forming a crescent-shaped patch, without backward prolongation on the median line.

Gill-rakers few, not very large, distant, about 1+7. Preopercle with its posterior margin extending very obliquely forward, the angle therefore very obtusely rounded; a broad shallow notch above the angle, the margin above the notch convex, its edge minutely serrulate; a few coarser teeth at the angle; lower border mostly smooth. In the adult the whole margin of the preopercle is without serrations; suprascapular serrate. Posterior nostril nearly round; a single narrow band of scales extending downward and backward from occiput. Dorsal spines rather long, with sharp flexible tips, the fourth the longest, but shorter than the snout, 3⅓ in head; anal spines short and strong, much stronger than dorsal spines, the second and third of nearly equal length, the second somewhat strongest, not much longer than diameter of the orbit, 4⅔ in head. Soft rays of anal low, 3¼ in head. Caudal fin emarginate, 1⅗ in head. Pectorals much longer than ventrals, extending slightly beyond them, their length 1⅖ in head.

Scales moderate firm, present on cheek, opercle, subopercle, and in a single series on interopercle. Scales above lateral line forming very oblique series running upward and backward, not parallel with the lateral line. Scales on breast not very small, smaller than those on opercle. Basal portions of vertical fins scaly.

Head $2\frac{2}{3}$ in length ($3\frac{1}{5}$ with caudal); depth $3\frac{2}{5}$ (4); eye $5\frac{1}{3}$ in head. D. X, 13; A. III, 7; scales 6–45–11; lateral line with 50 tubes.

Coloration: Back and sides very dark olive brown, the back with a slaty tinge, the sides often with some faint purplish; sides paler below; the belly and lower parts of head white. Each scale on the dorsal region with the basal half dark. Head colored like the body; maxillary brownish, no bluish streak on preorbital. Vertical fins dark brownish; the spinous dorsal olive brown with a narrow dark streak at base and tip; anal with the margin of its first 3 rays white; pectorals olivaceous brown; ventrals dark brownish, becoming reddish at base. Inside of mouth reddish yellow. Young with the margin of spinous dorsal, and most of anal black.

This species is very abundant in the harbor of Mazatlan. It reaches a weight of 15 pounds, and as a food-fish ranks high, little below the "*Pargo Colorado.*" It is known to the fishermen as "*Pargo prieto.*"

The species of *Lutjanus* found at Mazatlan may be thus compared:

*a.* Vomerine teeth forming an anchor-shaped patch, the band prolonged backward on the median line; body rather deep, the back somewhat elevated.

*b.* Second anal spine shorter than third; soft fins rather high; teeth weak; snout moderate; scales above lateral line forming oblique series; a temporal as well as an occipital band of scales; dorsal spines slender; pectoral fin long; posterior nostril oblong. Color red; a large black blotch on lateral line below last dorsal spines; back and sides with rows of dark spots following the series of scales; fins reddish. GUTTATUS.*

*bb.* Second anal spine longer than third; teeth strong, the upper canines very large; snout long and pointed, the preorbital broad; scales above lateral line forming series parallel with the lateral line; one narrow occipital band of scales; dorsal spines strong; pectoral fin long; posterior nostril slit-like. Color brownish, with faint silvery streaks along the rows of scales on sides; a light blue streak along preorbital and suborbital usually interrupted and often extending on the opercle; fins mostly pale ........................... ARGENTIVITTATUS.†

*aa.* Vomerine teeth forming a crescent-shaped patch, without prolongation on the median line.

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* *Mesoprion guttatus* Steindachner, Ichthyol. Notiz. ix, 18, 1869, taf. viii. Mazatlan (*Steind.*; *Gilb.*); Panama (*Gilb.*). This species has been erroneously confounded with the West Indian *L. synagris* (L) J. & G. (= *Mesoprion uninotatus* C. & V.), a species not yet known from the Pacific.

† *Mesoprion argentivittatus* Peters, Berlin. Monatsber. 1869, 704. Mazatlan (*Peters*; *Gilb.*); Acapulco (*Gilb.*), Panama (*Gilb.*). This species has been confounded with the closely-related *L. caxis* (*M. griseus* C. & V.) of the Atlantic. The latter is best distinguished by the direction of the rows of scales above the lateral line, which are not throughout parallel with the latter.

*c.* Scales above the lateral line forming oblique series; teeth very strong; lower jaw with about 8 canines, which are not much smaller than the canines of the upper jaw; posterior nostril nearly round; a narrow occipital band of scales; anal spines graduated; dorsal spines ten, rather slender; pectoral shortish, not nearly reaching anal; soft rays rather low; body rather elongate, the back not arched. Color dark brown; ventrals and anal largely blackish..PRIETO.

*cc.* Scales above the lateral line forming horizontal series parallel with the lateral line; teeth rather strong; the large teeth of the lower jaw not canine-like, much smaller than the upper canines; posterior nostril oblong; occipital band of scales very narrow.

*d.* Body rather deep, the depth about equal to length of head; scales rather small and firm, in five series above lateral line; second anal spine larger than third; dorsal spines ten, rather low and strong; soft rays of dorsal and anal high; pectorals long, about reaching anal. Color red, dusky above; a short blue streak on suborbitals; anal and ventrals largely dusky .....COLORADO.

*dd.* Body elongate, the back not elevated, the depth less than length of head; scales large and rather thin, in four series above lateral line; dorsal spines eleven, high and slender; second anal spine smaller than third; soft dorsal and anal low; pectorals much longer than ventrals, but not reaching vent. Color brown, with broad silvery stripes along the rows of scales; young with silvery bars; lower fins dusky.................................ARATUS.*

*aaa.* Vomerine teeth unknown; body elongate, the depth less than length of head; second anal spine longer than third; dorsal spines ten, low; pectorals very short, not longer than ventrals; scales rather small. Color purplish-brown, the centers of the scales paler; body with nine faint vertical bars; upper fins edged with dusky; base of pectoral dark ................NOVEMFASCIATUS.†

19. **Micropogon ectenes**, sp. nov. (28295, 29538, 28336, 28361.)

Head 3¼ in length (3⅔ with caudal); depth 3⅕ (4⅖). Length (28295) 16½ inches. D. X–I, 25 or X–I, 24; A. II, 7 or II, 8; scales 7–53–13; tubes of lateral line 54.

Body rather elongate, slenderer than in *M. undulatus*, moderately compressed, the back little elevated; anterior profile straightish or slightly undulate. Head long, rather low, the snout long, and abruptly truncate at the tip, which projects but little beyond the premaxillaries. Mouth nearly horizontal, the lower jaw included, the maxillary barely reaching to opposite front of eye; its length 3⅙ in head. Teeth in rather broad bands, the anterior in upper jaw little enlarged.

Snout with the usual lobes and pores at tip, its length 3⅙ in head; chin with 5 large pores; about four small barbels on the inner edge of each dentary bone anteriorly. These are rather shorter than the posterior nostril, which is oblong and much longer than the anterior nostril.

Eye rather large, 6 in head, 1½ in interorbital width, a little more than half snout, a little less than preorbital width. Preopercle with numerous rather strong teeth above the angle which has two large, strongly-divergent teeth; the lower of these is directed obliquely downward. Gill-rakers short. Pseudobranchiæ well developed.

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* *Mesoprion aratus* Günther, Proc. Zool. Soc. Lond. 1864, 145. Mazatlan (*Gilb.*); Punta Arenas (*Gilb.*); Chiapam (*Gthr.*); Panama (*Gthr.*, *Gilb.*).

† *Lutjanus novemfasciatus* Gill, Proc. Ac. Nat. Sci. Phila. 1862: *Mesoprion inermis* Berlin. Monatsber. 1869, 705. Cape San Lucas (*Gill*); Mazatlan (*Peters*). Not obtained by Mr. Gilbert.

Scales of moderate size, those on the breast little reduced. No scales on the dorsal or anal, except a basal series. Caudal largely scaly; about 20 scales in an oblique series from front of anal upward to spinous dorsal; 18 from vent upward to soft dorsal. Lateral line becoming straight well in advance of anal.

Spinous dorsal high, not higher than in *M. undulatus*, its third spine not very much shorter than the fourth. Third spine varying in length, about 2 in head (1¾ to 2⅓); all the spines freely flexible; longest soft ray 3¼ in head. Caudal slightly double-concave, the upper, middle, and lower rays about equal, 1⅔ in head; lower rays shorter in young specimens; anal small, ending well in advance of posterior ray of dorsal; second anal spine rather small, its length 3⅗ in head; longest soft ray 2½ in head. Pectoral fin very long and pointed, reaching past ventrals, but not to vent, its length 1⅙ in head. Ventrals with the first ray filamentous; 1⅘ in head, without filament.

Color grayish silvery, without brassy tinge; dorsal region and sides above lower edge of pectorals marked with dark streaks extending obliquely upward and backward along the series of scales. Besides these, about ten short oblique dark bars extending downward and forward, crossing the arched portion of the lateral line, the longest of these about as long as snout; lining of gill-cavity blackish; peritoneum pale; fins all yellowish, the tip of spinous dorsal blackish; upper edge of pectoral and border of soft dorsal dusky; region above and below base of pectoral with dark punctulations.

This species is rather common at Mazatlan, where it is known as "*Corbina.*" It was not noticed at Panama, where its place is taken by the closely related *Micropogon altipinnis*. It is closely allied to *Micropogon undulatus* (L.) C. & V., of the Atlantic coast, differing in its more elongate body, rather larger scales, &c. The color and number of fin rays are also somewhat different in the two species. From *M. altipinnis*, to which it is still more closely allied, it differs chiefly in the smaller scales and greater number of dorsal rays.

20. **Sciæna icistia**, sp. nov. (28182, 28228, 28275, 28368, 29566, 29613, 29615, 29775, 29790.)

Subgenus *Bairdiella* Gill.

Body elongate, compressed, the back a little elevated; snout very short, compressed, and rather blunt, 4 in head; mouth moderately wide, oblique; lower jaw somewhat included; maxillary reaching vertical from posterior margin of pupil, 2⅔ in head; upper jaw with a narrow band of villiform teeth and an external series of somewhat larger teeth; lower jaw with a single series of teeth smaller than the enlarged teeth of upper jaw and more close-set; in front this series broadens into a narrow band.

Chin with 4 pores; premaxillaries on the level of lower part of pupil projecting beyond snout. Interorbital region slightly depressed. Gill-rakers long and strong, about 6–17 in number. Preopercle with its lower edge smooth, the posterior edge armed with distinct spines, the three spines nearest the angle much the longest, the lowest directed vertically downward and somewhat forward. Eye large, its diameter slightly less than length of snout and than interorbital width, 4⅔ in length of head. Scales rather small; series of small scales on membrane of dorsal and anal; lateral line little arched, becoming straight opposite interval between vent and anal.

Spinous dorsal high, the spines all very slender, weak, and flexible, more slender than in other species of this subgenus; the third and fourth about equal, much longer than the others, the upper margin of the fin very oblique; the longest spine about seven-tenths length of head, much longer than the soft rays, which are about 3⅓ in head.

Second anal spine exceedingly strong, 1¾ in head, about four-fifths length of fourth dorsal spine, and about as long as first soft ray of anal; middle rays of caudal slightly produced, 1½ in head, the fin subtruncate. Ventrals long, their length more than half the distance from their base to origin of anal. Pectorals not reaching vertical from tips of ventrals, about equal to them in length, 1½ in head.

Head 3⅖ in length (4 with caudal); depth 3⅗ (4⅕). D. X–I, 25; A. II, 8; scales 9–62–15; Lat. l. with 52 tubes.

Color grayish silvery above, silvery on sides and below; dorsal region with faint streaks produced by darker centers of the scales. Spinous dorsal blackish, darker on membrane of first spine, the soft portion as well as the caudal yellowish-dusky. Ventrals and pectorals pale, each with a faint yellowish blotch; axil of pectoral black above; anal pale.

This species differs from *Sciæna armata* (*Bairdiella armata* Gill = *Corvina acutirostris* Steindachner) in the much longer and more slender dorsal spines, as well as in various details of form. The teeth of the lower jaw are also quite different.

*S. icistia* is very common at Mazatlan, where it is known as "*Corbineta*". It reaches an average length of 6 inches, and is little valued as a food-fish. Many specimens were obtained.

21. **Scarus perrico**, sp. nov. (28328 U. S. Nat. Mus.)

Subgenus *Hemistoma** Sw.; allied to *S. chlorodon* Jenyns.

Body robust, deep, compressed; top of head with a very large adipose hump. Teeth green; no pointed teeth at angle of mouth; upper lip covering about half the surface of the upper dentary plate; lower lip covering base only of lower dentary plate. Cheeks with two rows of scales, the lower of four, the upper of five; lower limb of preopercle wholly naked. Caudal fin somewhat rounded, its lobes not produced. Pectoral fin three-fourths length of head; ventrals inserted under front of pectorals.

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* *Hemistoma* Swainson, 1839 = *Pseudoscarus* Bleeker, 1861.

Coloration in life: light brownish, with some greenish shading on sides and bluish-green on caudal peduncle; fins all bright blue; snout and forehead bluish; orbits surrounded by radiating dots and dashes of green. In spirits: a yellowish area below and in front of eye; upper edge of dorsal and lower edges of caudal, anal, and ventrals yellowish, as is the lower side of the head.

Head, 3 in length; depth, 2⅓. D. IX, 10; A. II, 9; Lat. l. 24.

This species is very common in the rocks about Mazatlan, where it is called *Lora* or *Perrico*, both words meaning parrot. It is seldom caught and is not eaten. One specimen, 23 inches in length, was procured, and is the type of the species.

22. **Pomacanthus crescentalis**, sp. nov. (28139.)

Subgenus *Pomacanthodes* Gill; allied to *Pomacanthus zonipectus* (Gill) Gthr.

Body broadly ovate, with short and slender caudal peduncle. Head deeper than long, the profile very steep and uneven; a bulge above the occiput, another above the eye, and another at the premaxillaries, the interspaces between these concave. Eye broader than preorbital, 3½ in head (in the largest specimen), its diameter half the width of the cheeks below it. Eyes proportionally larger in smaller specimens. Vertical limb of preopercle minutely serrate, the spine at the angle about as long as pupil. Mouth small, with broad bands of setiform teeth as in other species. Length of mandible half greater than diameter of eye. Gill-rakers very short; gill-membranes narrowly joined to the isthmus.

Dorsal spines rapidly graduated, the last (eleventh) spine two-thirds to three-fourths length of head, three-fifths the height of the soft rays of dorsal. Anal spines long, stronger than those of dorsal, rapidly graduated. Soft rays of anal lower than those of dorsal, the outline of the fin rounded. Soft dorsal highest towards the front, the rays more rapidly shortened posteriorly than those of anal. Caudal peduncle deeper than long, the fin somewhat rounded. Pectoral fins short, reaching scarcely past vent, a little shorter than head. Ventrals elongate, the first ray filamentous; the fin one-third longer than head, reaching third anal spine.

Head everywhere scaly, the scales of head, breast, and front of back, very small; anteriorly reduced to shagreen-like roughness, as in *Pomacanthus arcuatus*. Scales of body irregular in size, very rough; large and small ones closely intermixed.

Head 3½ in length; depth 1½. D. XI–23; A. III, 22; Lat. l. *ca.* 70.

Color brownish-black, becoming pure black on dorsal and anal fins; top of head with a median line of bright yellow which divides on the snout, a branch passing down on each side of mouth, the two meeting, or nearly meeting, on the throat; a small white spot on chin; sides with five very distinct narrow bright yellow cross-bars, strongly convex forwards; the first from front of dorsal, touching posterior margin of orbit, extending along preopercle to base of spine, then turning abruptly backwards, the two meeting on belly immediately in front of ventral fins; the second from immediately in front of anal base, in a strong curve behind base of pectorals, reaching dorsal at base of seventh and eighth spines, thence narrowed and continued backwards on the fin; the third extends from eighth and ninth soft rays of dorsal to the fourth and fifth of the anal, the fourth from end of dorsal base to end of anal base, the two latter bands much curved and continued backwards on dorsal and anal fins, the attenuated ends sometimes blue; the fifth bar crosses the caudal near its base, and runs back on fin above and below. Between these yellow bars and parallel with them are numerous narrow blue lines. Dorsal blue-edged anteriorly, this color a backward continuation of the first bands. Caudal translucent with a vertical series of short linear black blotches.

This species is said by the fishermen to be common among the rocks in Mazatlan Harbor, and is called by them *Muñeca*. But two specimens were seen by the collector. Several others were afterwards obtained at Panama, where it is very common.

23. **Gobiesox zebra**, sp. nov. (29250.)

Body comparatively very long and narrow, the greatest width about one-fifth the total length. Head narrow, depressed, its width about 4½ times in length of body. Eye small, its diameter about half interorbital width. Opercular spine well developed. Ventral disk nearly as long as head. Mouth rather small, anterior, maxillary reaching front of eye. Incisors of lower jaw nearly horizontal, rather broad, three-lobed at tip, the middle cusp the longer. Upper teeth much smaller, the median ones compressed, blunt, close-set, a little shorter than the lateral teeth and with dentate edges; one or two series of small teeth close behind them. Anal beginning under middle of dorsal; the distance from insertion of dorsal to base of caudal is contained 3⅔ in length; pectoral half as long as head; caudal truncate with rounded angles.

Head 3⅔ in length; depth nearly 8. D. 7; A. 6.

Back with five dark cross-bars about as wide as the interspaces, three of them in front of the dorsal fin, the two anterior much broader and more distinct than the others; these bars are all distinct on the back, fading on the sides, which are often vaguely clouded with dark; the color of these dark bars varies from reddish-brown to black, and that of the interspaces from olivaceous to light pink and bright rose-red; top of head bright red, marbled with light slaty-bluish; a black blotch on opercle, and two very distinct black cross spots, one on each side of median line, forming the front of first dorsal bar; sometimes cheeks with 2 or 3 pale bluish streaks; dorsal, pectoral, and caudal more or less shaded with dusky; lower fins pale; usually a dark bar at base of caudal and one across middle of the fin.

Very abundant in the rocky tide-pools around Mazatlan, hiding under the numerous sea-urchins. About 30 specimens were collected, the largest nearly 3 inches long.

24. **Gobiesox eos**, sp. nov. (29247.)

Body comparatively short, stout, and narrow, the head rather broad, but, as well as the body, much less depressed than in *G. erythrops;* the width of the head less than its length, contained 3⅔ times in body; incisors serrate or tricuspid, the teeth as in *G. zebra*. Eye moderate, about 1½ in interorbital space, which is about 3½ in head. Pectoral about one-half length of head. Ventral disk shorter than head. Distance from base of caudal to front of dorsal 3⅘ in total length. Caudal truncate. Head 3 in length; depth 5½. D. 6; A. 6. Bright rosy red, sometimes made dusky above with black points; back with from one to three faint dark bars; three dark lines downwards and backwards from orbit, and usually one or two more on the opercle; caudal usually with a reddish bar at base and a dusky one towards tip; fins otherwise nearly plain.

Very abundant in the rock-pools, where it is nearly always found, in company with *G. zebra*, hiding under the sea-urchins. The largest examples seen are about 1½ inches long.

25. **Gobiesox erythrops**, sp. nov. (29248.)

Head scarcely longer than broad, proportionately very broad and depressed, its breadth three times in total. Incisors in both jaws entire and rather broad, the lateral teeth, as usual, pointed; no canines. Eyes very large, considerably wider than the narrow interorbital area, 3⅓ in head; interorbital area nearly 5 in head. Ventral disk a little longer than head, 2⅔ in body. Pectoral about one-third length of head. Distance from front of dorsal to caudal, 3⅖ in body. Caudal truncate with rounded edges.

Head 2½; depth 6. D. 6; A. 5.

Light olivaceous; body with three or four bars of cherry red; head marbled with red; eyes intensely cherry red, their upper border blackish; fins pale, the upper mottled with reddish; caudal barred with red.

But two specimens, 1½ inches long, taken in a rock-pool; evidently rare. A specimen of this species from the Tres Marias Islands, is in the collection at Woodward's Gardens, San Francisco.

26. **Gobiesox adustus**, sp. nov. (29249.)

Head and body broad and flat, much depressed; width of head nearly equal to its length, 3⅔ in body. Incisors in middle of lower jaw broad, entire; those in upper jaw narrow, blunt, little compressed, entire, shorter than the lateral teeth; behind these two or three series of smaller teeth. Eyes rather large, separated by a broad interorbital space, which is one-third the length of the head and about half greater than diameter of eye. Opercular spine sharp. Pectoral short, about half length of head; ventral disk as long as head; distance from base of caudal to front of dorsal equaling three-tenths of the length; caudal rounded behind.

Head 3 in length; depth 5½. D. 9; A. 7.

Brown, banded with blackish on body, the head marbled with darker brown; front of dorsal black, the fins dusky with dark points.

Three specimens, the largest about 2 inches long, were obtained in a tide-pool at Mazatlan. The species is evidently not common.

27. **Gobiosoma zosterurum**, sp. nov. (29245.)

Body long, slender, its greatest depth less than greatest depth of head. Head long, slender; mouth large, the lower jaw projecting; maxillary extending slightly beyond posterior edge of orbit. Eye rather large, longer than snout, 3⅔ in head; the interorbital space narrower than the pupil. Teeth small, in villiform bands, the outer in the upper jaw slightly enlarged. Snout rather pointed, subconical, the profile not very gibbous. Spinous dorsal high, the spines slender, the anterior filamentous, its height considerably more than greatest depth of body. Ventrals 1⅗ in length of head; pectorals short, half length of head. Caudal ⅗ length of head, skin wholly naked.

Head 3⅓ in length; depth 6⅔; D. IV–10; A. 12. Olivaceous, vaguely barred, everywhere closely punctate with darker, even the belly not pale; lower parts of head thickly punctate with dark dots like the sides; sides of body and head with some faint pale spots; caudal with two distinct black lengthwise bands, its upper and lower edges white, the middle part colored like the body; dorsal and anal largely black, with pale edgings; pectorals and ventrals dusky.

A single specimen about 1½ inches long was taken with a seine in the Astillero at Mazatlan.

28. **Clinus zonifer**, sp. nov. (28122.)

Subgenus *Labrosomus* Swainson; allied to *Clinus delalandi* C. & V.

Form rather stout, compressed; snout not very short, rather pointed, the profile gibbous above the eyes, thence declining straight to the tip of the snout; mouth rather small, the maxillary reaching front of eye; eye large, 3½ in head, as long as snout; small slender cirri above the eyes, and a fringe of rather long filaments at the nape rather longer than the orbital cirri. Outline of spinous dorsal emarginate; first spine a little longer than eye, the second, third, and fourth progressively shortened, the fifth again longer; the eighth to eleventh spines are the longest, thence gradually decreasing to the next to the last, which is much shorter than the last; soft dorsal rays considerably higher than the spines, the longest about one-half length of head. Anal long, not very high, the membrane deeply notched between all but the last six rays, which are the highest. Pectorals five-sixths length of head;

ventrals as long as from snout to edge of preopercle. Belly naked anteriorly; the scales small, cycloid; lateral line complete.

Head 3½ in length; depth 4⅕. D. XIX, 9; A. II, 19; Lat. l. 53.

Color olivaceous, darker above, much mottled and speckled with clear dark brown; sides with five distinct irregular dark brown bars, extending from base of dorsal to level of lower margin of pectoral, their lower edges connected by a vague undulating longitudinal band; a blackish blotch on occipital region, and black blotches on cheeks, opercles, and before base of pectoral; opercle with several narrow pinkish streaks; head below with narrow streaks formed by series of dark brown spots; an interrupted brown bar across lower jaw; belly unspotted; ventrals pale; other fins all barred with narrow series of dark brown dots; anal somewhat dusky.

*Clinus zonifer* is the most abundant denizen of the rock-pools around Mazatlan, with the single exception of *Gobius soporator*, and reaches a length of about three inches. This is the species mentioned by Mr. Lockington (Proc. Acad. Nat. Sci. Philad. 1881, 114) as *Clinus phillipi* Steind., from the Gulf of California.

29. **Tripterygium carminale**, sp. nov. (28118.)

Body rather slender, heavy forwards, rapidly tapering behind. Head short, the snout low and rather pointed, the profile straight and steep from the snout to opposite the front of the eyes, there forming an angle and extending backwards nearly in a straight line. Eyes very large, longer than snout, 3 in head, high up and close together. Mouth wide, the jaws subequal, the maxillary extending backwards to front of pupil. Teeth moderate, essentially as in species of *Clinus*, those of the outer series enlarged. No evident cirri on the head. Scales on body of moderate size, ctenoid, the edges strongly pectinate; belly naked; lateral line extending to opposite last ray of soft dorsal, ascending anteriorly but without convex curve. Dorsals three, the first and second contiguous, the second and third well separated; first dorsal of three spines, the first of which is the highest and about as long as diameter of eye; the second dorsal of higher and slenderer spines, the anterior the highest, the longest about equaling greatest depth of body; soft dorsal shorter and a little lower than second spinous dorsal. Caudal small. Anal long, beginning nearly under middle of spinous dorsal. Pectoral long, longer than head, reaching much past front of anal. Ventral three-fourths length of head.

Head 3⅔ in length; depth about 5½. D. III–XII, 9; A. II, 17; Lat. l. 40.

Color light brownish, with four dark brown cross-bars on sides, about as wide as the interspaces, which are marked with more or less reddish and with some lighter spots; belly pale; space behind pectoral dark; a dark bar downward and one forward from eye. First dorsal mottled with darker, second and third dorsals nearly plain; a narrow dark bar at base of caudal, and a broader one towards tip, the fin sometimes entirely black, pectorals somewhat barred; lower fins plain.

This species is represented in our collection by four specimens, each about 1½ inches long, taken from a deep tide-pool at Mazatlan.

30. **Salarias chiostictus**, sp. nov. (28117.)

Body moderately elongate, compressed, the head short, blunt, almost globular, about as broad as deep, and a little longer than broad. Mouth inferior, without lateral cleft, the lower jaw included; width of cleft of mouth two-thirds length of head. Teeth small, weak, finely pectinate; canine teeth small, not so long as diameter of pupil. Supraorbital cirrus divided in four, its height three-fourths that of the eye. Eye 3⅓ in head. Interorbital space channelled, narrower than eye. Maxillary extending to behind middle of eye. No crest on top of head. First dorsal low and even, its spines rather slender, the last spines short, scarcely connected by membrane with the soft rays; soft dorsal well separated from caudal. Caudal subtruncate, with rounded angles. Anal lower than soft dorsal, with a little longer base. Pectorals a little longer than head; ventrals about half as long.

Head 4⅕ in length; depth 5¼; D. XII–15; A. 15.

Color in life: Olive brown above, lighter below; five broad dark bars from dorsal fin to middle of sides, each terminating above on the fin, and below on sides in a pair of black spots; sometimes only the spots are distinguishable, the bars being obscure; sides below spinous dorsal with numerous black specks, and with numerous oblong spots of bright silvery; sometimes a silvery streak from upper portion of base of pectorals to base of caudal; a broad salmon-colored streak on each side of ventral line; sometimes the space between the silvery lateral band and the base of the anal is darker, the vertical bars again appearing as pairs of black, vertical blotches. Head yellowish olive, darker above and reticulated with narrow brown lines, these appearing as parallel bars on the upper lip and radiating from the median line on the under side of the head. Vertical fins light grayish, with black spots, which appear as wavy bars on the caudal fin. Pectorals and ventrals pale, the former with a yellowish shade at base. Orbital tentacles bright red.

This species is known from four specimens (the largest 2¼ inches in length), taken in a deep rock pool at Mazatlan.

31. **Fierasfer arenicola**, sp. nov. (29244.)

Body with nape slightly elevated, thence tapering regularly to the tail. Snout blunt, rounded, protruding; the mouth subinferior, nearly horizontal, large, the lower jaw included; gape wide, the maxillary one-half length of head, extending beyond the vertical from orbit; teeth in upper jaw very small, acute, in a narrow band, none of them enlarged; those in lower jaw and on vomer blunt, conic, in a wide band; those in outer series acute; a few on each side of mandible, and two or three anteriorly on vomer enlarged, canine-like.

Gill-openings very wide, the branchiostegal membranes little united, leaving nearly all of isthmus uncovered; the membranes united as far back only as vertical from end of maxillary. Opercle adherent above the upper angle, which is produced in a point extending above the base of pectorals. Below the angle the opercular margin runs very obliquely forwards. Eye large, equaling length of snout, greater than interorbital width.

Origin of dorsal fin distant from nape by the length of the head; the fin a very inconspicuous fold anteriorly, becoming higher posteriorly, where the rays are evident. Anal well developed along entire length, beginning immediately behind vent and running to tail; its rays visible. Caudal exceedingly short. Pectorals very well developed, more than half length of head. Vent just in front of base of pectorals.

Head 6½ in length; depth 10½; eye 5 in head.

Head and body perfectly translucent; a faint silvery luster on middle of sides anteriorly; a few inconspicuous small light yellowish spots along middle of sides (disappearing in alcohol); tip of tail dusky; upper margin of orbit black.

A single specimen, 3¼ inches long, was found buried in the sand at tow-tide on the beach of Mazatlan.

32. **Etropus crossotus**, gen. and sp. nov. (*Pleuronectidæ.*) (28124.)

CHAR. GEN.—Eyes and color on the left side. Body deep, regularly oval. Head small; mouth very small, the teeth close set, pointed, in a single series, mostly on the blind side. Eyes narrow, separated by a narrow scaleless ridge. Margin of preopercle free. Ventrals free from the anal, that of colored side on ridge of abdomen. Dorsal beginning above eye; caudal fin double truncate; anal fin not preceded by a spine; scales thin, ctenoid on left side, smooth on blind side; lateral line simple, nearly straight. (ετρον, abdomen; πους, foot; the ventral being on the ridge of the abdomen.)

CHAR. SPEC.—Body oval, strongly compressed, with the dorsal and ventral curves nearly equal; both outlines strongly arched anteriorly. Head very small; snout short; mouth very small, its cleft not so long as the diameter of the orbit. Teeth conical, pointed, close-set, strongly incurved, in a single series. Those in the upper jaw on the blind side only; those in the lower jaw, on both sides. Eyes large, the lower in advance of the upper, the two separated by a very narrow scaleless ridge, which extends backward above the preopercle. Edge of opercle on the blind side, with a row of conspicuous white ciliæ. Upper nostril turned somewhat to blind side; anterior nostril of left side, with a very slender cirrus.

Dorsal fin commencing over front of upper eye, its middle rays highest, the anterior not elevated. Anal fin not preceded by a spine, its middle rays highest. Caudal fin very sharply double-truncate; as long as head. Pectorals short, that of left side the longer, about three-fourths length of head. Ventral of colored side on the ridge of the abdomen; the membrane of its last ray nearly reaching base of first ray of anal. Ventral of blind side longer than the other, half the length of the head, inserted farther forward than the ventral of colored side. Vent lateral, with a well-developed anal papilla.

Scales thin, large; ctenoid on colored side, smooth on blind side, those on the middle part of the body larger. Head entirely scaly, except snout and interorbital ridge. Rays of vertical fins, with scales on the basal half, on colored side. Lateral line developed equally on both sides, nearly straight.

Head $4\frac{4}{5}$ in length; depth $1\frac{8}{10}$. D. 80; A. 61; V. 6; Lat. l. about 48.

Color light olive brown, with some darker blotches. Vertical fins finely mottled and streaked with black and gray. Pectoral and ventral of left side spotted.

A single specimen, about 5 inches long, was taken with a seine in the Astillero at Mazatlan. Numerous others were afterwards obtained at Panama.

33. **Malthe elater**, sp. nov. (28127.)

Body very broad and depressed, the disk considerably broader than long, its width $1\frac{2}{5}$ times in length of body; back and snout considerably raised above rest of body; greatest depth of body scarcely more than width of mouth. Mouth small, its width half greater than diameter of orbit. Snout very short, scarcely projecting beyond mouth, its length about equal to the interorbital width, shorter than its own width in front. Eye rather large, much longer than snout, wider than the interorbital area. Process representing first dorsal spine present, small. Skin covered with spines which are comparatively slender and sharp, their stellate bases inconspicuous; the spines on snout and middle of back and tail largest, much slenderer and sharper than in *M. notata*. No spines on ocellæ of back. Belly rough. Under side of tail with tubercular plates. Tail depressed towards base of fin. Soft dorsal and anal so shrunken that the rays cannot be counted. Pectorals one-third longer than ventrals, their length $1\frac{2}{3}$ width of mouth. Caudal a little longer than pectoral, $4\frac{1}{3}$ in body. Length 4 inches.

Color light olive, above everywhere thickly and uniformly covered with small round spots of dark brown, these about as large as the pupil, and about as wide as the lighter interspaces. A conspicuous ocellus, larger than eye, on each side of back. This ocellus has a bright yellow central spot surround by a black ring, around which is a pale ring, and finally a fainter dark one. Under parts plain white. Pectorals spotted; caudal yellowish at base with a terminal blackish band.

A single specimen was collected in Mazatlan Harbor and presented to the National Museum by Dr. J. U. Bastow. Two other specimens were afterwards seen but not obtained. The species is evidently rare at Mazatlan, and is unknown to the fishermen.

## DESCRIPTION OF A NEW OWL FROM PORTO RICO.

### By ROBERT RIDGWAY.

### ASIO PORTORICENSIS, sp. nov.

SP. CH.—Above dusky brown, nearly or quite uniform on the dorsal region; the scapulars, however, narrowly bordered with pale ochraceous or dull buff; feathers of the head narrowly, and those of the nape broadly, edged with buffy; rump and upper tail-coverts paler brown or fawn-color, the feathers marked near their tips by a crescentic bar of dark brown. Tail deep ochraceous, crossed by about five distinct bands of dark brown, these very narrow on the lateral rectrices, but growing gradually broader toward the intermediæ, which are dark brown, with five or six pairs of ochraceous spots (corresponding in position to the ochraceous interspaces on the other tail feathers), these spots sometimes having a central small brown blotch. Wings with dark brown prevailing, but this much broken by a general and conspicuous spotting of ochraceous; primaries crossed with bands of dark brown and deep ochraceous, the latter broadest on the outer quills, the *pictura* of which is much as in *A. accipitrinus*, but with the lighter color usually less extended. Face with dull, rather pale, ochraceous prevailing; this becoming nearly white exteriorly, where bordered, around the side of the head, by a uniform dark brown post-auricular bar; eyes entirely surrounded by uniform dusky, this broadest beneath and behind the eye. Lower parts pale ochraceous or buff, the crissum, anal region, tarsi, and tibiæ entirely immaculate; jugulum and breast marked with broad stripes of dull brown, the abdomen, sides, and flanks with narrow stripes or streaks of the same. Lining of the wing nearly immaculate ochraceous. Bill dusky; iris yellow. Wing, 11.25–12.00; tail, 5.25–5.50; culmen, .70; tarsus, 1.85–2.00; middle toe, 1.20–1.30.

*Hab.*—Porto Rico.

In "History of North American Birds," Vol. III, p. 25, under the head of "*Otus brachyotus*," reference was made to this form of the Short-eared Owl, as follows: "A specimen from Porto Rico (No. 39643) is somewhat remarkable on account of the prevalence of the dusky of the upper parts, the unusually few and narrow stripes of the lower parts, the roundish ochraceous spots on the wings, and in having the primaries barred to the base. Should all other specimens from the same region agree in these characters, they might form a diagnosable race. The plumage has an abnormal appearance, however, and I much doubt whether others like it will ever be taken." That the latter unfortunate prediction was quite unnecessary is fully demonstrated by three additional specimens kindly sent me for examination by Mr. George N. Lawrence, all of which closely resemble the one in the National

Museum collection. In fact, the characters of the four examples are so uniform as to leave no doubt that the Porto Rican Short-eared Owl is a well marked local form, which, on account of its isolation and consequent improbability of its intergradation with *A. accipitrinus*, I propose to recognize as a distinct species.

In connection with this subject I have carefully examined a very large series of *A. accipitrinus*, and have been entirely unable to distinguish between *continental* specimens from any part of the world. Examples from Chili, the Argentine Republic, Brazil, and Costa Rica can be perfectly matched by others from North America and Asia; an example from Costa Rica is almost exactly like one from Beyrout, Syria; another from the Sandwich Islands is undistinguishable from certain American specimens, while there appears to be no constant difference between North American specimens and those from Europe and Asia. As a rule, European skins are paler than North American ones; but the palest (as well as the most deeply colored) examples I have seen are from North America. In short, I find that in a series from any given locality, on either continent, the individual variation is greater than any geographical variation in this species.

Although I have not seen the Short-eared Owl of the Galapagos (*Otus galapagoensis* Gould), I have no doubt of the validity of that species. The transverse bars on the feathers of the lower parts and the longitudinal streaks on the legs, are features never observable in *A. accipitrinus* nor in *A. portoricensis*. In other respects, however, *A. galapagoensis* appears to be quite similar to the latter, but is still darker colored, as well as smaller.

It appears, therefore, that, besides the common and nearly cosmopolitan *A. accipitrinus*, there are two* well-marked insular forms belonging to the subgenus *Brachyotus*, which, though in all probability descended from the same ancestral stock, should, on account of their geographical isolation, be considered as distinct species. Compared with *A. accipitrinus*, they differ from that species, and from each other, as follows:

*a.* Legs entirely immaculate; lower parts without trace of transverse bars; first primary much shorter than second.

1. A. ACCIPITRINUS. Dorsal region conspicuously striped with ochraceous; outer webs of primaries with ochraceous largely prevailing toward the base. Wing usually more than 12.00 inches. *Hab.*—Europe, Asia, the whole of continental America, and Sandwich Islands. (Strongs Island, West Indies?)

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* A single specimen of a Short-eared Owl from Strong's Island, West Indies (No. 66235, U. S. Nat. Mus.), appears at first glance to be quite peculiar in coloration, by reason of the general prevalence of ochraceous above, the nearly uniform reddish ochraceous of the rump and upper tail-coverts, and more nearly uniform brownish of the wing-coverts, especially the smaller ones. There are also other slight differences, appreciable to the eye but difficult to define, and it may be that the specimen in question merely represents one of the many individual variations of the common species. I therefore, for the present at least, refer it to *A. accipitrinus*, since it would be unsafe to predicate a local race upon a single specimen. The measurements are as follows: Wing, 11.50; tail, 5.75; culmen, .80; tarsus, 1.80; middle toe, 1.15.

2. A. PORTORICENSIS. Dorsal region nearly uniform dark brown; outer webs of primaries with the ochraceous spaces scarcely or not at all more extensive than the brown ones on the basal portion of the quills. Wing, 11.25–12.00. *Hab.*—Porto Rico.

*b.* Legs marked with narrow dusky streaks; lower parts with a greater or less number of transverse bars; first primary scarcely shorter than the second.

3. A. GALAPAGOENSIS. Dorsal region irregularly barred or transversely spotted with fulvous; outer webs of primaries with the brown spaces more extensive than the fulvous ones, on the basal portion of the quills. Wing, 11.00. *Hab.*—Galapagos Islands.

I am aware that my conclusions, as given above, are somewhat different from those of Mr. R. B. Sharpe in vol. ii as expressed in his "*Catalogue of the Striges*" in the British Museum (pp. 238, 239). Mr. Sharpe there arranges the specimens of *A. accipitrinus* in the British Museum collection under four headings, as follows: "*α. Asio accipitrinus*," "*β. Asio cassini*," "*γ. Asio galapagoensis*," and "*δ. Asio sandwichensis*"; this arrangement being based upon the examination of 39 specimens of the first, 24 of "*β*", 3 of "*γ*", and 2 specimens of the last named. He admits, however, the impossibility of always distinguishing between American and European specimens, though he states that "in America the general run of the specimens is rather darker and more ochraceous," both of which statements entirely agree with my own observations. The Falkland Island birds, says Mr. Sharpe, "seem permanently rufescent, but cannot be distinguished from some Chilian skins; and as some of the latter agree perfectly with European examples, no line for specific separation can be drawn." As for myself, never having seen specimens from the Falkland Islands, I am unable to comment thereon.

The Galapagos Short-eared Owl is referred by Mr. Sharpe to *A. accipitrinus* solely, it appears, on account of the close resemblance between a Bogota skin and specimens from those islands in general darkness of coloration; but since the former is especially stated to lack the leg-streaks, which constitute perhaps the most important character of coloration in *A. galapagoensis*, it would seem that such a view of the case is hardly warranted. That this disposition of *A. galapagoensis* was, however, made very doubtfully by Mr. Sharpe is evident from his remarks in connection with the subject, as follows: "The Owl from the Galapagos is by far the most different of any, by reason of its small size, dark coloration, golden forehead, and striped thigh-feathers. I have never seen a specimen from any other locality exhibiting the latter character; at the same time a Bogota skin in every other respect approaches it in appearance, and therefore, although I admit that at present it would appear to be specifically distinct, I should like to be sure that the New Granadan Short-eared Owl would not form a connecting link."

"The specimens from the Sandwich Islands," says Mr. Sharpe, "form an interesting pair on account of their locality, but they cannot be separated as a species. They are rather small, and have a very dusky frontal patch; this I have found in other Asiatic specimens, and therefore the Sandwich Island Owl can only be considered a small race of *A. accipitrinus*."

The United States National Museum possesses a single specimen (No. 13890, T. R. Peale) of the Short-eared Owl from the Sandwich Islands, and this one can be exactly matched, both in coloration and dimensions, by American specimens, while many of the latter are smaller than the two Honolulu examples the measurements of which are given by Mr. Sharpe. Thus it seems that the Sandwich Island bird can be in no way separated from the common and widely distributed *A. accipitrinus*.

As to the difference in coloration said by Mr. Sharpe to distinguish the sexes in this species, I cannot substantiate it with regard to the specimens in the United States National Museum, if the determinations of collectors are to be relied upon. Two specimens from China, represent nearly the extremes of coloration, yet the lighter colored one is the female, the darker one the male (according to the labels); one of the lightest colored of North American specimens is marked as a female, while many dark colored specimens are determined as males. Neither can I agree with Mr. Sharpe in his opinion that the dark bar or spot sometimes found on the basal portion of the inner web of the outer primary is a "tolerably good indication of an adult bird," but from an examination of many specimens am inclined to regard it as merely an individual peculiarity, having no reference to either age or sex. As to the very marked variation in the depth of the ochraceous coloring (some specimens being deeply tawny and others nearly white beneath), it appears to me that the two extremes, instead of being sexual, are merely analogous to the normal and erythrismal phases of other Owls, there being every gradation in different specimens between the two extremes of coloration.

Below are given the principal synonyms and references pertaining to *A. accipitrinus* and its allies.

### 1. ASIO ACCIPITRINUS (Pall.) Newton.

(*Short-eared Owl.*)

*Noctua major* Briss. Orn. i, 1760, 511 (excl. syn. pt.). (*Le Grande Chouette.*)
*Strix accipitrina* Pall. Reise Russ. Reichs. i, 1771–'76, 455.
  *Asio accipitrinus* Newt. ed Yarrell's Brit. B. i, 1872, 163.—Sharpe, Cat. Striges Brit. Mus. 1875, 234 (excl. syn. *galapagoensis* Gould.)—Ridgw. Nom. N. Am. B. 1881, 36, No. 396.
  *Brachyotus accipitrinus* Gurney Ibis, 1872, 328 (Formosa).
*Noctua minor* S. G. Gmel. N. Comm. Petrop. xv, 1771, 447, pl. 12.
*Strix arctica* Sparrm. Mus. Carls. 1786–'89, pl. 51.—Daud. Tr. Orn. ii, 1800, 197.
*Strix brachyotus* J. R. Forst. Phil. Trans. lxii, 1772, 384 (Severn R., Arctic, Am.!).—Gmel. S. N. i, pt. 1, 1788, 289.—Wils. Am. Orn. iv, 1812, 64, pl. 33, fig. 3.—Naum. Vög. Deutschl. i, 1820, 459, pl. 45, fig. 1 ("*brachyotos*").—Nutt.

Man. i, 1832, 132.—AUD. Orn. Biog. v, 1839, 273, pl. 432.—SW. & RICH. F. B. A. ii, 1831, 75 ("*brachyota*").

*Strix brachiotus* MEYER & WOLF Tascheub. Vög. Deutschl. i, 1810, 43.

*Otus brachyotus* BOIE Isis, 1822, 549.—AUD. Synop. 1839, 28; B. A. Am. i, 1840, pl. 38.—CASS. Illustr. 1854, 182.—SCL. & SALV. Nom. Neotr. 1873, 116.

*Otus* (*Brachyotus*) *brachyotus* RIDGW. in B. B. & R. Hist. N. Am. B. iii, 1874, 22.

*Asio brachyotus* MACGILL. Hist. Brit. B. iii, 1840, 461.—STRICKL. Orn. Syn. i, 1855, 209.

*Ulula brachyotus* MACGILL. Rapac. B. Gt. Brit. ——, 412.

*Ægolius brachyotus* KEYS. & BLAS. Wirb. Eur. 1840, 32, 143.

"*Strix ulula*" GMEL. (*nec* LINN.) S. N. i, pt. 1, 1788, 294.—PALL. Zoög. Rosso-As. i, 1831, 322.

"*Asio ulula*" LESS. Man. i, 1831, 116.

"*Otus ulula*" CUV. Règ. An. i, 1817, 328.

*Strix tripennis* SCHRANK. Fauna Boica, i, 1798, 112.

? *Strix palustris* BECHST. Nat. Deutschl. ii, 1791, 344; ed. 2, ii, 1805, 906.

*Otus palustris* BREHM Vög. Deutschl. 1831, 124.

*Brachyotus palustris* BONAP. Comp. List, 1838, 7; Consp. i, 1850, 51.—GOULD B. Eur. pl. 40; B. Gt. Brit. pl. xxxii.—DEKAY Zool. N. Y. ii, 1844, 28, pl. 12, f. 27.—COUES Key, 1872, 204; Check List, 1873, No. 321; B. N. W. 1874, 306.

*Strix passerina*, Var. B. LATH. Ind. Orn. i, 1790, 66.

*Strix caspia* SHAW Gen. Zool. vii. 1809, 272.

*Strix ægolius* PALL. Zoög. Rosso-As. i, 1831, 309.

*Brachyotus ægolius* BONAP. Rev. et Mag. Zool. 1854, 541.

*Otus microcephalus* LEACH Syst. Cat. Brit. Mus. 1816, 11.

*Strix brachyura* NILSS. Orn. Suec. i, 1817, 62.

*Otus agrarius* BREHM Vög. Deutschl. 1831, 124.

*Brachyotus agrarius* BREHM Naum. 1855, 270.

*Brachyotus palustris europæus* BONAP. Consp. i, 1850, 51.

*Brachyotus palustris americanus* BONAP. l. c.

*Otus brachyotus americanus* MAX. J. f. O. 1858, 27.

*Otus breviarius* LICHT. Nomencl. 1854, 6 (Brazil).—SCHLEG. Mus. P.-B. *Oti*, 1862, 4.

*Brachyotus leucopsis* BREHM Naum. 1855, 270.

*Brachyotus cassini* BREWER Pr. Boston Soc. 1856, ——; N. Am. Oöl. i, 1857, 68.—CASS. Baird's B. N. Am. 1858, 54; Orn. U. S. Expl. Exp. 1858, 108.—BAIRD Cat. N. Am. B. 1859, No. ——.

*Otus cassini* Gray Hand-l. i, 1869, 51.

*Otus brachyotus β. cassini* RIDGW. Field and Forest, June, 1877, 210.

*Asio accipitrinus, β. Asio cassini* SHARPE Cat. Striges Brit. Mus. 1875, 238.

*Strix sandwichensis* BLOX. Voy. Blonde, 1826, 250 (Sandwich Islands).

*Asio sandvichensis* BLYTH Ibis, 1863, 27.

*Asio accipitrinus, δ. Asio sandwichensis* SHARPE, l. c.

*Brachyotus gmelinii* MALM. Göteb. och Bohusl. Fauna, 1877, 75.

*La Chouette* BUFF. Pl. Enl. 488.

*Caspian Owl* LATH. Synop. i, 1785, 147.

## 2. ASIO PORTORICENSIS Ridgw.

(*Porto Rican Short-eared Owl.*)

"*Otus* (*Brachyotus*) *brachyotus*" RIDGW. (part) in B. B. & R. Hist. N. Am. B. iii, 1874, 25 (spec. ex Porto Rico).

"*Brachyotus cassinii*" GUNDL. J. f. O. 1874, 307, 310.

*Asio portoricensis* RIDGW. MSS.

### 3. ASIO GALAPAGOENSIS (Gould) Strickl.

*(Galapagoan Short-eared Owl.)*

*Otus (Brachyotus) galapagoensis* GOULD PZS. 1837, 10 (Galápagos).
*Brachyotus galapagoensis* BONAP. Consp. i, 1850, 51.—CASS. Illustr. B. Cal. Tex. etc. 1854, 183.
*Otus galapagoensis* DARWIN Voy. Beag. Birds, iii, 1844, 32, pl. 3.—GRAY Genera B. i, 1844, 40; List. B. Brit. Mus. ——, 108; Hand-l. i, 1869, 51.
*Asio galapagoensis* STRICKL. Orn. Syn. i, 1855, 211.
*Brachyotus palustris*, c. *galapagoensis* COUES Birds N. W. 1874, 307.
"*Asio accipitrinus*" SHARPE Cat. Strig. Brit. Mus. 1875, 234 (part).
*Asio accipitrinus*, γ. *Asio galapagoensis* SHARPE t. c. 238 (*Galapagos*).

SMITHSONIAN INSTITUTION, *January* 13, 1881.

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## DESCRIPTION OF TWO NEW RACES OF MYADESTES OBSCURUS LAFR.

### By LEONHARD STEJNEGER.

During a recent examination of the species of the genus *Myadestes*, I have found that *M. obscurus* ought to be divided into three distinct races. I am indebted to the kindness of the authorities of the National Museum for the opportunity of describing them.

Prof. S. F. BAIRD in his "Review" of American Birds, I, p. 431, has already remarked, that "in specimens from Western Mexico, Tonila, and Tres Marias, the ash of head invades the back," and that "the rufous of the back is paler." But I find, also, that the specimens from the continent and those from the islands mentioned differ from each other so essentially in other particulars, that I have thought it convenient to separate them as follows:

$a^1$ Head and neck slate-colored, rest of upper parts brownish olive.
1. *M. obscurus* LAFR.

$a^2$ Head, neck, and fore part of the back lighter ash-colored, changing gradually into the paler olivaceous of the remaining upper parts.
  $b^1$ First primary not longer than the longest of the primary coverts; the second shorter than the seventh. Only the three outer tail-feathers tipped with white. Innermost secondaries without light edges on the tip.
  2. *M. obscurus* var. *occidentalis* STEJNEGER.
  $b^2$ First primary much longer than the longest of the primary coverts, the second equal to the seventh. All the tail-feathers distinctly tipped with white. Innermost secondaries with the tips light-edged.
  3. *M. obscurus* var. *insularis* STEJNEGER.

### MYADESTES OBSCURUS *Lafr.*

*Myadestes obscurus* LAFR. Rev. Zool. 1839, p. 98.—BAIRD, Rev. Amer. Birds, I, p. 430.—SCLAT. and SALV. Exot. Ornith. pt. iv, p. 49, pl. xxv.

DESCR.—(*U. S. Nat. Mus. No.* 30722. *Volcan de Fuego, Guatemala, Nov.*, 1861. O. SALVIN.)—Slate-gray, the back brownish olive, more rusty on the fore part, and more olivaceous on the rump and upper tail-coverts; upper head and neck gray, the latter slightly washed with olivaceous, the forehead scarcely lighter. Round the eye a pure white ring; chin, a stripe from the nostrils to above the eye, and another from the base of the lower mandible, between the black of the lores and line bordering the chin to below the eye dull whitish, fading out gradually into the gray of the sides of the head and the throat. The flanks are strongly suffused with olivaceous, the remaining under parts very slightly so, the middle of the belly and the edges of the under tail-coverts becoming dull white. Wing feathers brownish black, edged with bright rusty on the outer web; the concealed base and edge of the inner web of secondaries and inner primaries light buff, forming two large patches on the under side of the wing. Tail-feathers black, except the middle pair, which are gray, tinged with olive, especially on the outer web; the exterior pair has the outer web and the apical half of the inner one light grayish buff, the edge of the light-colored part and the tip being white; the next pair has only a wedge-shaped and similar colored patch towards the tip; the third pair with a narrow tip of white. Feet brown; bill brownish black.

*List of specimens examined, and their dimensions.*

| U. S. National Museum catalogue number. | Locality. | When collected. | From whom received. | Sex and age. | Length of 1st primary. | Length of 2d primary. | Wing. | Tail to basal end of feathers. | Tarsus. | Middle toe and claw. | Bill: Exposed culmen. | Bill: Along gape. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *mm* | *mm* | *mm* | *mm* | *mm* | *mm* | *mm* | *mm* |
| 13660 | Orizaba, Mex | .......... | SCLATER | —ad | 23 | 63 | 100 | 97 | 20 | .... | 11 | 19 |
| 30722 | Volc. de Fuego, Guat | Nov., 1861 | SALVIN | —ad | 22 | 61 | 99 | 96 | 20 | 20 | 11 | 19 |
| 37500 | Orizaba, Mex | .......... | SUMICHRAST | —ad | 24 | 66 | 102 | 95 | 20 | 20 | 12 | 19 |

*Wing formula.*

| United States National Museum catalogue number. | Distance from the tip of the longest primary to the tip of the— | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1st. | 2d. | 3d. | 4th. | 5th. | 6th. | 7th. |
| | *mm.* | *mm.* | *mm.* | *mm.* | *mm.* | *mm.* | *mm.* |
| 13660 | 56 | 13 | 3 | 0 | 0 | 2 | 11 |
| 30722 | 55 | 14 | 5 | 1 | 0 | 3 | 11 |
| 37500 | 54 | 13 | 3 | 0 | 1 | 5 | 14 |

*Hab.*—High table-land of Southern Mexico and Guatemala.

### MYADESTES OBSCURUS var. OCCIDENTALIS *Stejneger.*

***Myiadestes obscurus*** **LAFR. apud BAIRD, Rev. Amer. Birds, i, p. 430 (*part*).**

DESCR.—(*U. S. Nat. Mus. No.* 35038.—*♂ ad. Tonila, Jalisco, October,* 1863. JOHN XANTUS.) Light slate-gray, only the interscapulars, hind back, rump, and upper tail-coverts suffused with olive, somewhat rusty on the middle of the back; the head, neck, and upper back gray, forehead as light as the chin. Flanks pure gray without olive tinge. In other respects the colors agree with the typical form, excepting that the gray on the under parts is lighter and purer, and the rusty on the wings paler and more mixed with olive.

*Dimensions.*—Length of the first primary, 18$^{mm}$; of the second, 66$^{mm}$. Wing, 105; tail to basal end of feathers, 101; tarsus, 21; middle toe with claw, 19; exposed culmen, 11; and commissure, 18$^{mm}$.

*Wing formula.*—Distance from the tip of the longest primary to the tip of the 1st, 63; 2d, 16; 3d, 4; 4th, 0; 5th, 1; 6th, 4; and 7th, 13$^{mm}$.

*Hab.*—Southwestern coast of Mexico and Guatemala.

*Remarks.*—The chief differences between the typical *obscurus* and the above-described race consist in the rather duller shade of the gray, and the brighter color of the rusty in the former, and in the absence of the rusty or olive wash on the fore part of the back and the flanks in the latter. In many respects it comes very near to *Myadestes elisabeth*, but is easily distinguishable from this species by having the wings more rusty, and the upper head and fore part of the back pure gray.

### MYADESTES OBSCURUS var. INSULARIS *Stejneger.*

*Myiadestes obscurus* LAFR. apud BAIRD, Rev. Amer. Birds, i, p. 430 (*part*).—LAWR. Proc. Bost. Soc. Nat. Hist. 1871, p. 277, and Extr. p. 19.

DESCR.—(*U. S. Nat. Mus. No.* 37327.—♂ *ad. Tres Marias Islands, Jan.*, 1865. Col. A. J. GRAYSON.) In color this race shows very great resemblance to the foregoing, the olive-colored part of the back being only a trifle more rusty. It differs, however, in having the light forehead decidedly tinged with olivaceous buff, as also the light malar stripe; besides, the flanks are slightly tinged with olive. The most striking differences, however, are the light buff edges on the tip of the innermost secondaries, and the small, but very distinct and pure white spot on the tip of *all* the tail feathers. GRAYSON (LAWR. l. c.) gives the color of the eyes and the feet as black; but the latter are in the three specimens before me clear umber brown.

*List of specimens examined, and their dimensions.*

| U. S. National Museum catalogue number. | Locality. | When collected. | From whom received. | Sex and age. | Length of 1st primary. | Length of 2d primary. | Wing. | Tail to basal end of feathers. | Tarsus. | Middle toe and claw. | Bill: Exposed culmen. | Bill: Along gape. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *mm* | *mm* | *mm* | *mm* | *mm* | *mm* | *mm* | *mm* |
| 37327 | Tres Marias Islands .. | Jan., 1865 | Colonel GRAYSON.. | ♂ ad. | 23 | 67 | 100 | 102 | 23 | 21 | 11 | 17 |
| 37328 | ......do ............... | Jan., 1865 | ....do ............ | ♂ ad. | 24 | 65 | 98 | 96 | 23 | 22 | 11 | 18 |
| 55461 | ......do ............... | .......... | ....do ............ | ♂ ad. | 22 | 65 | 97 | 96 | 22 | 21 | 11 | 19 |

Colonel Grayson gives (l. c.) the total length of the male, measured fresh, to 7.90 inches.

*Wing formula.*

| United States National Museum catalogue number. | Distance from the tip of the longest primary to the tip of the— | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1st. | 2d. | 3d. | 4th. | 5th. | 6th. | 7th. |
| | *mm.* | *mm.* | *mm.* | *mm.* | *mm.* | *mm.* | *mm.* |
| 37327 | 53 | 9 | 2 | 0 | 0 | 3 | 10 |
| 37328 | 50 | 10 | 1 | 0 | 0 | 2 | 10 |
| 55051 | 51 | 10 | 1 | 0 | 0 | 2 | 10 |

*Hab.*—Tres Marias Islands.

*Remarks.*—This insular race is distinguishable from the var. *occidentalis* mainly by its less pointed wings and the longer first primary. In color, the two races agree very well, except that the bird from the Tres Marias Islands shows a faint olive wash all over. From both the other forms it may be easily distinguished by the light edgings on the inner secondaries, and the very distinct white tip of the tail feathers, which is to be found also on the three middle pairs. It seems that this character is constant, and that it does not depend on seasonal change or more or less good state of the feathers. All the specimens, which I have examined, seem to have been collected in the winter, and the quills are in all of them in a quite perfect state.

WASHINGTON, D. C., *January* 12, 1882.

## DESCRIPTIONS OF TWO NEW THRUSHES FROM THE UNITED STATES.

### By ROBERT RIDGWAY.

### 2*a*. HYLOCICHLA FUSCESCENS SALICICOLA subsp. nov.

(*Willow Thrush.*)

*Turdus fuscescens* BAIRD, B. N. Am. 1858, 922, 927 (Ft. Bridger, Wyoming); Rev. Am. B. i, 1864, 17 (part; spec. from Ft. Bridger).—ALLEN, Bull. M. C. Z. iii, 1872, 155, 173 (Mts. of Colorado).—RIDGW. Bull. Essex Inst. 1873, 172 (Salt Lake Valley, Utah); Bull. Essex Inst. 1873, 179 (Colorado); *ib.* 1875, 35 (Provo R., Utah); Orn. 40th Paral. 1874, 398 (valleys of Bear, Provo, and Weber R's, Utah; breeding).—HENSHAW, Ann. Lyc. N. Y. xi, 1874 (Utah); Rep. Wheeler's Exp. 1874, 39, 56, 71 (do.); Zoöl. Wheeler's Exp. 1875, 148 (Denver & Ft. Garland, Colorado; breeding).—COUES, B. N. W. 1874, 5 (part).

*Turdus* (*Hylocichla*) *fuscescens* COUES, B. Col. Val. 1878, 39 (part).

CH.—Similar to *H. fuscescens*, but averaging decidedly larger, the upper parts much less tawny, and the jugulum less distinctly buff. Wing, 3.80–4.25 (4.02); tail, 2.95–3.40 (3.20); culmen, .55–.60 (.57); tarsus, 1.15–1.28 (1.17); middle toe, .65–.75 (.69).*

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*Extreme and average measurements of 11 adults.

*Adult in spring.*—Above uniform russet-olive (much as in *H. ustulata*); jugulum and lower part of throat pale buff, as in *ustulata*, much lighter than in *fuscescens*, the markings, however, small and narrow as in the latter. Sides of head dull grayish, without trace of lighter orbital ring; sides of breast, sides, and flanks ash-gray (rather deeper than in *fuscescens*), the breast very faintly or not at all spotted with darker.

*Adult in fall and winter.*—Above darker, more umber, brown; jugulum and lower part and sides of throat deeper buff, with much darker spots.

The general appearance of this bird at first glance is more that of *H. ustulata* than true *H. fuscescens*, the upper parts and anterior lower parts being quite similarly colored. A close examination, however, immediately reveals radical differences, the most important of which is the total absence of any light orbital ring, which is always present, and very distinct, in *ustulata*. The wings and tail, instead of being appreciably more rufescent than the back and rump are, on the other hand, less so; the buff of the jugulum gives way very abruptly to the ash-gray on the sides of the breast, and the spots end quite as abruptly, the breast being plain ash-gray laterally, and white medially, with very indistinct spots of grayish between the white and the gray. In *ustulata* the sides are decidedly brown, with very distinct transverse spots of a darker shade of the same color entirely across the breast. Another excellent character consists in the color of the axillars and lining of the wing, which are light grayish in the present bird, and deep brownish buff in *ustulata*.

The differences from typical *fuscescens* of the Atlantic States, as indicated in the above diagnosis, are exceedingly constant.

A specimen from Chicago, Ill., in the collection of H. K. Coale, of that city (No. 1568, Coll. H. K. C., Sept. 16), is referable to this race, and is evidently a fall straggler from the Rocky Mountain district. It is even more olive above than most specimens from that region, having almost exactly the same shade of color as a fall specimen of *H. swainsoni* from Massachusetts, the latter, however, an unusually brown example. The entire absence of any light orbital ring, the narrow, almost linear, streaks of the jugulum, and the peculiar proportions, however, refer it at once to *fuscescens*.

I have called this new form *salicicola* on account of its marked predilection for willow thickets, to which, along the streams in the valleys and lower cañons of the Rocky Mountain region, it is chiefly confined during the breeding season.

*List of specimens examined.*

MALES.

| Catalogue number. | Locality. | Age. | Date. | Wing from carpal joint. | Tail to basal end of feathers. | Tarsal joint. | Middle toe. | Culmen. |
|---|---|---|---|---|---|---|---|---|
| 79461 N. M. | Fort Garland, Colo | Ad. | May 28 | 4.25 | 3.40 | 1.20 | .70 | .55 |
| 66667 N. M. | ......do | Ad. | May 26 | 4.10 | 3.30 | 1.15 | .70 | .60 |
| 66668 N. M. | ......do | Ad. | May 17 | 4.20 | 3.25 | 1.15 | .70 | .55 |
| 66689 N. M. | ......do | Ad. | June 10 | 4.10 | 3.25 | 1.20 | .65 | .58 |
| 10882 N. M. | Fort Bridger, Wyo | Ad. | May 28 | 4.00 | 3.10 | 1.15 | .68 | .58 |
| | Average | | | 4.13 | 3.26 | 1.17 | .69 | .57 |
| | **FEMALES.** | | | | | | | |
| 79460 N. M. | Fort Garland, Colo | Ad. | June 19 | 4.00 | 3.25 | 1.12 | .65 | .55 |
| 69898 N. M. | Laramie, Wyo | Ad. | | 3.80 | 2.95 | 1.10 | .70 | .55 |
| 10881 N. M. | Fort Bridger, Wyo | Ad. | May 27 | 3.90 | 3.05 | 1.15 | .68 | .58 |
| | Average | | | 3.90 | 3.08 | 1.12 | .68 | .56 |
| | **SEX NOT DETERMINED.** | | | | | | | |
| 65051 N. M. | Fort Rice, Dak | Ad. | June 14 | 4.05 | 3.20 | 1.15 | .71 | .55 |
| 41519 N. M. | Montana Territory | Ad. | May — | 4.05 | 3.30 | 1.28 | .75 | |
| 65893 N. M. | Souris River, Dakota | Ad. | Sept. 16 | 4.00 | 3.30 | 1.20 | .68 | .60 |
| | Average of sex not determined | | | 4.03 | 3.27 | 1.21 | .71 | .57 |
| | Average of males | | | 4.13 | 3.26 | 1.17 | .69 | .57 |
| | Average of females | | | 3.90 | 3.08 | 1.12 | .68 | .56 |
| | | | | 12.06 | 9.51 | 3.50 | 2.08 | 1.70 |
| | Average of both sexes | | | 4.02 | 3.20 | 1.17 | .69 | .57 |

Below is given a list of the specimens of *H. fuscescens* examined in this connection, with their measurements.

MALES.

| Catalogue number. | Locality. | Age. | Date. | Wing from carpal joint. | Tail to basal end of feathers. | Tarsal joint. | Middle toe. | Culmen. |
|---|---|---|---|---|---|---|---|---|
| —— H.W.H. | Washington, D. C | Ad. | Sept. 13 | 4.00 | 3.10 | 1.05 | .65 | .58 |
| 82511 Nat. M. | Fairfax County, Virginia | Ad. | Sept. 6 | 4.05 | 3.10 | 1.18 | .72 | .57 |
| 2145 Nat. M. | Carlisle, Pa | Ad. | Apr. 26 | 4.15 | 3.00 | 1.20 | .70 | .60 |
| 26 E. P. B. | Riverdale, N. Y | Ad. | Aug. 28 | 4.00 | 3.05 | 1.20 | .70 | .50 |
| 28 E. P. B. | ......do | Ad. | Aug. 26 | 3.90 | 3.00 | 1.12 | .72 | .50 |
| 690 E. P. B. | ......do | Ad. | Sept. 28 | 4.00 | 2.90 | 1.20 | .70 | .55 |
| 142 H.W.H. | Cambridge, Mass | Ad. | May 26 | 3.90 | 3.00 | 1.18 | .70 | .58 |
| —— H.W.H. | ......do | Ad. | June 12 | 3.80 | 3.05 | 1.25 | .70 | .58 |
| 63058 Nat. M. | ......do | Ad. | | 4.10 | 3.10 | 1.18 | .70 | .58 |
| 63062 Nat. M. | ......do | Ad. | | 4.15 | 3.05 | 1.20 | .70 | .60 |
| 82508 Nat. M. | ......do | Ad. | May 21 | 4.15 | 3.30 | 1.25 | .70 | .60 |
| 13698 Nat. M. | Rainy Lake, Manitoba | Ad. | May 29 | 4.00 | 2.90 | 1.10 | .70 | .60 |
| 63847 Nat. M. | Pembina, Dak | Ad. | June 14 | 4.00 | 3.10 | 1.20 | | .58 |
| | Average | | | 4.01 | 3.05 | 1.18 | .70 | .57 |

*List of specimens examined*—Continued.

FEMALES.

| Catalogue number. | Locality. | Age. | Date. | Wing from carpal joint. | Tail to basal end of feathers. | Tarsal joint. | Middle toe. | Culmen. |
|---|---|---|---|---|---|---|---|---|
| —— H.W.H. | Washington, D. C | Ad. | Sept. 13 | 3.85 | 2.90 | 1.15 | .70 | .52 |
| 273 H.W.H. | Cambridge, Mass | Ad. | Sept. 18 | 3.80 | 2.80 | 1.12 | .70 | .52 |
| 82510 Nat. M. | Concord, Mass | Ad. | May 16 | 3.80 | 2.90 | 1.10 | .65 | .52 |
| 989 Nat. M. | Carlisle, Pa | Ad. | May 18 | 3.75 | 3.00 | 1.12 | ...... | .58 |
| 503 E. P. B. | Riverdale, N. Y | Ad. | Sept. 2 | 3.70 | 2.70 | 1.10 | .65 | .52 |
| 587 E. P. B. | ......do | Ad. | June 9 | 3.85 | 3.00 | 1.20 | .70 | .60 |
| 27 E. P. B. | ......do | Ad. | Sept. 4 | 3.75 | 2.85 | 1.12 | .70 | .55 |
|  | Average of females | ...... | .......... | 3.79 | 2.88 | 1.13 | .68 | .54 |
|  | Average of males | ...... | .......... | 4.01 | 3.05 | 1.18 | .70 | .57 |
|  |  |  |  | 7.80 | 5.93 | 2.31 | 1.38 | 1.11 |
|  | Average of both sexes | ...... | .......... | 3.90 | 2.96 | 1.15 | .69 | .55 |

## 3a. HYLOCICHLA ALICIÆ BICKNELLI Ridgw.

### (*Bicknell's Thrush.*)

CH.—Similar to *Hylocichla aliciæ* Baird, but much smaller and (usually) with the bill more slender. Wing, 3.40–3.80 (3.65); tail, 2.60–2.90 (2.75); culmen, .50–.52 (.5); tarsus, 1.10–1.25 (1.13); middle toe, .65–.70 (.68).

*Hab.*—Breeding near the summit of Slide Mountain, Ulster County, New York (BICKNELL), and probably in other mountainous districts of the northeastern United States; in migrations mixed with *H. aliciæ*.

Mr. Eugene P. Bicknell, of Riverdale, N. Y., has very kindly given me permission to describe the present new Thrush, which no one else appears to have met with. The above diagnoses and following remarks are based entirely upon the specimens in Mr. Bicknell's collection, which are the only ones I have seen. It is also proper to state here that the differences presented by these specimens from true *H. aliciæ* were first noticed by Mr. Bicknell, and by him pointed out to me.

The seven specimens upon which this new race is based are uniformly very much smaller than true *H. aliciæ*, with slenderer bills, and present also certain slight but rather indefinite peculiarities of coloration. After a very careful comparison, however, I am unable to find any constant color-differences which can be expressed in a diagnosis. Some specimens, notably the two males from Slide Mountain (where Mr. Bicknell found the present bird breeding in company with *H. ustulata swainsoni* and *H. unalascæ pallasi*, and having very distinctive habits and notes as compared with the two species in question), have the upper parts much browner than in *aliciæ*, with the wings and tail appreciably more reddish. In fact, the general aspect of the upper parts approaches more closely that of *H. ustulata*, but the shade is much darker and less fulvous, while, as in typical *aliciæ*, there is no trace of a lighter orbital ring. The bill is much more slender than in most specimens of the larger form, while in several examples it is of a very peculiar shape, being much depressed basally, with the middle portion of the culmen somewhat concave. In fact, the bill in these specimens is much like that of the Nightingale (*Luscinia philomela*) in shape, but with even a more prominent angle at the base of the gonys, and still more depressed at the base. The extreme form of the bill, in this respect, as exhibited in No. 653 (coll. E. P. B.), suggests very strongly that of *Cinclus*.

Mr. Bicknell sends me the following notes, based upon his specimens:

"In regard to the differences of coloration of the two forms, I find that, though some specimens in my series can be closely matched, the majority can be separated by color differences. These, however, are not very tangible, but most specimens of the smaller form present a somewhat undefinable appearance, which separates them from the larger. This is best seen about the head, and seems to be produced by a brownish shade relieving those colors which in true *aliciæ* are dark and sooty. Though my two Catskill examples are darker than spring specimens of *aliciæ*, specimens of the smaller form taken in the fall are quite uniformly paler than those of true *aliciæ* taken at the same season; and though this seems to be contrary to a recognized law of geographical distribution, it certainly is the fact. Besides in the general color it is noticeable in the legs and feet, some of the smaller forms having the tarsi a pale clear yellow, while in many large specimens they are uniformly dark. The base of the lower mandible is also more largely and generally yellow in the smaller form."

*List of specimens examined.*

MALES.

| Catalogue number. | Locality. | Age. | Date. | Wing. | Tail. | Tarsus. | Middle toe. | Culmen. |
|---|---|---|---|---|---|---|---|---|
| 345 E. P. B. | Riverdale, N. Y | Ad. | May 24 | 3.75 | 2.60 | 1.15 | .70 | .52 |
| 692 E. P. B. | ......do | Ad. | Sept. 29 | 3.70 | 2.80 | 1.10 | .70 | .52 |
| 652 E. P. B. | Slide Mountain, N. Y | Ad. | June 15 | 3.70 | 2.90 | 1.10 | .68 | .52 |
| 653 E. P. B. | ......do | Ad. | June 15 | 3.75 | 2.90 | 1.25 | .70 | .52 |
| | Average | | | 3.72 | 2.85 | 1.15 | .69 | .52 |
| | FEMALES. | | | | | | | |
| 706 E. P. B. | Riverdale, N. Y | Ad. | Oct. 8 | 3.40 | 2.60 | 1.10 | .68 | .50 |
| 23 E. P. B. | ......do | Ad. | Sept. 27 | 3.80 | 2.70 | 1.12 | .65 | .50 |
| | Average | | | 3.60 | 2.65 | 1.11 | .66 | .50 |
| | SEX UNDETERMINED. | | | | | | | |
| 17 E. P. B. | Riverdale, N. Y | Ad. | (Fall.) | 3.55 | 2.75 | 1.15 | .70 | .51 |
| | | | | 3.72 | 2.85 | 1.15 | .69 | .52 |
| | Average both sexes | | | 3.62 | 2.75 | 1.14 | .68 | .51 |

For comparison, I give below measurements of all the specimens of *H. aliciæ* Baird examined in connection with the present subject:

MALES.

| Catalogue number. | Locality. | Age. | Wing from carpal joint. | Tail to basal end of feathers. | Tarsal joint. | Middle toe. | Bill above. | Date. |
|---|---|---|---|---|---|---|---|---|
| 18072 Nat. M. | Groswater Bay, Labrador | Ad. | 4.30 | 3.00 | 1.20 | .68 | .58 | July 24 |
| 323 H. W. H. | Cambridge, Mass | Ad. | 4.20 | 3.20 | 1.20 | .70 | .55 | Sept. 28 |
| 339 H. W. H. | ......do | Ad. | 3.85 | 3.05 | 1.20 | .70 | .52 | Sept. 30 |
| 340 H. W. H. | ......do | Ad. | 4.20 | 3.15 | 1.25 | .72 | .55 | Sept. 30 |
| 82512 Nat. M. | ......do | Ad. | 4.10 | 3.05 | 1.20 | .65 | .57 | Oct. 5 |
| 63064 Nat. M. | ......do | Ad. | 4.00 | 3.00 | 1.18 | .72 | .52 | |
| 77170 Nat. M. | Cook County, Illinois | Ad. | 4.30 | 3.10 | 1.20 | .70 | .55 | May 8 |
| 82519 Nat. M. | Mount Carmel, Ill | Ad. | 4.10 | 3.00 | 1.15 | .70 | .50 | Oct. 15 |
| 82516 Nat. M. | Fairfax County, Virginia | Ad. | 4.40 | 3.25 | 1.20 | .70 | .58 | May 10 |
| 25213 Nat. M. | Washington, D. C | Ad. | 4.25 | 3.20 | 1.25 | .68 | ...... | Sept.— |
| 70160 Nat. M. | Saint Michaels, Alaska | Ad. | 4.20 | 2.90 | 1.18 | .70 | .57 | |
| 81304 Nat. M. | ......do | Ad. | 4.20 | 3.00 | 1.20 | .67 | .55 | June 5 |
| 81334 Nat. M. | Kodiak, Alaska | Ad | 4.30 | 3.00 | 1.15 | .67 | .... | July 13 |
| 4708 Nat. M. | Vermilion River | Ad. | 4.25 | 3.05 | 1.18 | .70 | .52 | |
| 54368 Nat. M. | Yakuts, Alaska | Ad. | 4.10 | 2.85 | 1.15 | .70 | .52 | June 12 |
| 340 E. P. B. | Riverdale, N. Y | Ad. | 4.20 | 3.40 | 1.30 | .72 | .55 | May 21 |
| 541 E. P. B. | ......do | Ad. | 4.25 | 3.15 | 1.30 | .75 | .52 | Sept. 25 |
| 339 E. P. B. | ......do | Ad. | 4.35 | 3.20 | 1.20 | .70 | .55 | May 21 |
| 691 E. P. B. | ......do | Ad. | 4.20 | 3.25 | 1.15 | .70 | .58 | Sept. 29 |
| —— E. P. B. | ......do | Ad. | 3.85 | 3.10 | 1.12 | .67 | .52 | Sept. 30 |
| 18 E. P. B. | ......do | Ad. | 4.15 | 3.20 | 1.25 | .70 | .55 | Oct. 11 |
| 697 E. P. B. | ......do | Ad. | 4.00 | 3.00 | 1.19 | .71 | .52 | Oct. 4 |
| 25 E. P. B. | ......do | Ad. | 4.15 | 3.10 | 1.22 | .71 | .55 | Oct. 14 |
| 707 E. P. B. | ......do | Ad. | 3.95 | 3.00 | 1.20 | .72 | .58 | Oct. 8 |
| | Average | ...... | 4.16 | 3.17 | 1.20 | .70 | .55 | |

FEMALES.

| Catalogue number. | Locality. | Age. | Wing from carpal joint. | Tail to basal end of feathers. | Tarsal joint. | Middle toe. | Bill above. | Date. |
|---|---|---|---|---|---|---|---|---|
| —— H. W. H. | Grantville, Mass | Ad. | 3.90 | 2.85 | 1.15 | .75 | .57 | May 23 |
| —— H. W. H. | ......do | Ad. | 3.75 | 2.85 | 1.18 | .65 | .58 | May 4 |
| 63066 Nat. M. | ......do | Ad. | 4.10 | 3.10 | 1.15 | .68 | .57 | |
| —— H. W. H. | Washington, D. C | Ad. | 3.90 | 2.95 | 1.20 | .68 | .58 | Oct. 12 |
| —— H. W. H. | ......do | Ad. | 4.05 | 3.00 | 1.25 | .70 | .55 | Oct. 12 |
| 82515 Nat. M. | ......do | Ad. | 3.90 | 2.90 | 1.18 | .65 | .45! | Sept. 26 |
| 59601 Nat. M. | ......do | Ad. | 3.90 | 3.00 | 1.15 | .70 | .57 | Sept. 29 |
| 71159 Nat. M. | Fort Sisseton, Dak | Ad. | 4.10 | 2.90 | 1.12 | .60 | .55 | May 28 |
| 55502 Nat. M. | Fort Macon, N. C | Ad. | 4.20 | 3.20 | 1.15 | .70 | .58 | May 4 |
| 22607 Nat. M. | Fort Simpson, British America | Ad. | 4.05 | 2.90 | 1.20 | .68 | .57 | Sept. 10 |
| 43194 Nat. M. | Fort Anderson, British America | Ad. | 3.95 | 2.90 | 1.12 | .65 | .52 | June 11 |
| 43205 Nat. M. | ......do | Ad. | 4.05 | 2.90 | 1.12 | ...... | .55 | June— |
| 19 E. P. B. | Riverdale, N. Y | Ad. | 4.00 | 3.05 | 1.15 | .68 | .57 | Oct. 18 |
| 623 E. P. B. | ......do | Ad. | 3.95 | 2.85 | 1.15 | .65 | .50 | Oct. 2 |
| | Average of females | ...... | 3.99 | 3.02 | 1.16 | .67 | .55 | |
| | Average of males | ...... | 4.16 | 3.17 | 1.20 | .70 | .55 | |
| | | | 8.15 | 6.19 | 2.36 | 1.37 | 1.10 | |
| | Average of both sexes | ...... | 4.07 | 3.09 | 1.18 | .68 | .55 | |

## BENTHODESMUS, A NEW GENUS OF DEEP-SEA FISHES, ALLIED TO LEPIDOPUS.

### By G. BROWN GOODE and TARLETON H. BEAN.

The United States Fish Commission has recently received from Capt. Roderick Morrison, of the Gloucester fishing schooner Laura Nelson, a remarkable fish, taken from the stomach of a halibut caught on the western edge of the Grand Bank of Newfoundland in eighty fathoms of water. The specimen represents a species first made known by F. E. Clarke in Transactions and Proceedings of the New Zealand Institute, (xi, 1878, p. 294, pl. xiv) under the name *Lepidopus elongatus*. Clarke had seen eight or ten examples, all taken at Hokitika, on the South Island of the New Zealand group. Hokitika is in about south latitude 43° and east longitude 171°. A remarkable range is thus discovered for this singular *Trichiurid*. The species differs in so many important characters from *Lepidopus* and other allied genera that we are forced to establish for it a new genus more nearly related to *Evoxymetopon* Poey and *Lepidopus* Gouan than to any other forms at present known to ichthyologists. Its distinctive characters may be formulated as follows:

BENTHODESMUS new genus, TRICHIURIDÆ.

Body naked, much compressed, attenuate, tapering gradually from vent to base of caudal. Caudal peduncle very slender, supporting a small but well-developed caudal fin. Vent considerably nearer to head than to tail.

Lateral line simple, in a deep, wide furrow, nearly straight, in front of the vent gradually ascending to the scapular region.

Head compressed, its upper profile nearly horizontal; snout gibbous near its end, as in *Lepidopus*.

Top of head very flat, concave between the eyes, with no occipital crest. Interorbital ridges not elevated.

Eyes large, slightly postmedian. Operculum oblong, reaching a little beyond the base of the pectoral fin. Nostrils horizontal, in front of the eyes.

Supramaxillary not extending to vertical from front of eyes. Lower jaw with stout cutaneous appendage.

Three very long, simple, compressed teeth on each intermaxillary in front; outside of these a few minute teeth, and behind them a row of large acicular teeth. In lower jaw a single row of moderately large acicular teeth, more numerous than in the upper jaw, largest in the middle of the jaw. Palatine teeth minute.

Dorsal fin, beginning above the operculum, nearly uniform in height throughout its entire length, and continuous almost to the caudal. Rays very numerous (over 150 in *B. elongatus*). Anal beginning near the vent, preceded by a single scale-like appendage; spines very numerous (numbering with the rays about 100 in *B. elongatus*, all except 28 or 30 being spines), minute and almost hidden; a short fin posteriorly.

Caudal small, normal, forked.

Pectoral fins inserted almost horizontally, with lower rays longest, and its upper outline rounded.

Ventral fins represented each by a minute scale-like spine, inserted below the origin of the pectorals.

Pseudobranchiæ present; gills 4, a slit behind the fourth.

Gill-rakers short and spiny, in a single series on the first and second arches, almost obsolete on the the third and fourth. (In *Lepidopus caudatus* all the arches are supplied with several series of rakers.)

Type, *Lepidopus elongatus* Clarke.

*Benthodesmus* may be distinguished from *Lepidopus*, the most closely related genus, by the following salient characters:

1. The slenderer, lower form of the body, the height of which in *B. elongatus* at the vent is one-fourth the length of the head, in *Lepidopus caudatus*, nearly half the length of the head.

2. In the location of the vent, which is considerably nearer to the head.

3. In the straighter course of the lateral line, and the greater size of the furrow in which it is situated.

4. In the depressed form of the head, its flat profile, the insignificance of the frontal ridges, and the absence of the occipital crest.

5. In the horizontal instead of oblique position of the nostrils.

6. In the extension of the opercula beyond the origin of the pectorals, and in the rounded upper outline of the pectorals.

7. In the much greater number of dorsal rays.

8. In the more advanced position of the rudimentary ventrals, which are situated in *Benthodesmus* under the base of the pectorals, in *Lepidopus* under their tips.

9. In the presence of a single small postanal scute, in place of the two larger ones in *Lepidopus*.

10. In the characteristic arrangement of the gill-rakers.

BENTHODESMUS ELONGATUS (Clarke) Goode and Bean.

Extreme length of type (No. 29116), 896 millimeters (35½ inches).

Body attenuate, its height at the vent contained four times in length of head, its width being about one-third of its height at the point mentioned. Length of caudal peduncle half of greatest height of body. Least height of tail one-third width of interorbital area.

Length of head contained 7½ times in length of body, its greatest width one-sixth of its length; its greatest height nearly one-fourth of its length; width of interorbital area (on the bone) one-fourth of the height of the head. Length of snout contained 2½ times in length of head. Upper jaw not reaching to vertical from anterior margin of eye, and equal in length to the postorbital portion of head. Lower jaw in length equal to about twice the greatest height of body. Mandibular tip nearly one-third as long as the diameter of the eye. Eye slightly postmedian in location, the orbital diameter equal to half the length of the snout.

Besides the three long teeth, there are on each intermaxillary 8 or 9 of moderate size; on one side many small intermediate teeth are present. The number of teeth in the lower jaw varies from 13 on the one side to 21 on the other.

The first branchial arch has 13 gill-rakers, the longest of which measures about 2 millimeters. The second arch has about the same number, while on the third there are but 6 or 7, very small, and present only in the angles, while in the fourth there are about the same number, very inconspicuous.

The dorsal fin originates above the middle of the operculum, and at a distance from the snout equal to twice the length of the snout.

The anal fin is composed of about 100 spines and rays. Owing to the mutilation of the specimen it is impossible to determine how many there are of each, but there are supposed to be about 28 rays normally united by a membrane into a fin.

The caudal is also imperfect, but the middle rays are seen to be about half as long as the remnants of the external rays. The fin is supposed to resemble in shape that of *Lepidopus caudatus.*

The pectoral originates under the tip of the opercular flap. Its outline is rounded above instead of emarginate, as in *Lepidopus caudatus.* Its longest ray equals in length the postorbital part of the head.

The ventrals originate at a distance from the snout equal to that of the base of the pectorals from the same point. They are rudimentary and represented by minute scutes, the length of which is 3½ millimeters in the specimen before us, and about equal to half the interorbital width.

Branchiostegals 7; D. 154; A. 100; P. 12; V. I.

Cæcal appendages 8 in the specimen examined. Some, however, may have been lost, the abdominal viscera having been partly digested by the halibut, in the stomach of which it was found.

Color: Uniform silvery, with traces of dark color upon head and tail.

### *Measurements.*

Taken by Capt. Roderick Morrison (schooner Laura Nelson), from the stomach of a halibut.

Current number of specimen, 29116.

Locality, western edge of Grand Bank, 80 fathoms.

| | Millimeters. |
|---|---|
| Extreme length | 896 = (35¼ inches.) |
| Length to origin of middle caudal rays | 878 |
| Body: | |
| Greatest height | 33 |
| Greatest width | 13 |
| Height at ventrals | 33 |
| Height at anus | 30 |
| Least height of tail | 2 |
| Length of caudal peduncle | 16 |
| Head: | |
| Greatest length | 116 |
| Greatest width | 20 |
| Width of interorbital area (on the bone) | 6 |
| Length of snout | 47 |
| Length of upper jaw | 42 |
| Length of mandible | 69 |
| Length of mandibulary tip | 6 |
| Distance from snout to orbit | 47 |
| Diameter of eye | 22 |

| | |
|---|---|
| **Dorsal** (*spinous*): | |
| Distance from snout | 94 |
| Length of longest ray | 20 |
| Length of last ray | 7 |
| **Anal**: | |
| Distance from snout | 350 |
| Length of longest ray | 9 |
| **Caudal**: | |
| Length of middle rays | 8 |
| Length of external rays | 17 + |
| **Pectoral**: | |
| Distance from snout | 110 |
| Length | 42 |
| **Ventral**: | |
| Distance from snout | 111 |
| Length | $3\frac{1}{4}$ |
| **Branchiostegals** | VII |
| **Dorsal** | 154 |
| **Anal**,*about | 100 |
| **Pectoral** | 12 |
| **Ventral** | I, I |
| Number of cæcal appendages | 8 (?) |

U. S. NATIONAL MUSEUM, *Washington, D. C.*, *Dec.* 30, 1881.

## DESCRIPTION OF A NEW SPECIES OF POMADASYS FROM MAZATLAN, WITH A KEY TO THE SPECIES KNOWN TO INHABIT THE PACIFIC COASTS OF TROPICAL AMERICA.

### By DAVID S. JORDAN and CHARLES H. GILBERT.

**Pomadasys cæsius** sp. nov.

Allied to *P. pacifici* (Gthr.).

Head, $3\frac{1}{5}$ in length ($3\frac{4}{5}$ with caudal); depth, $2\frac{1}{3}$ ($2\frac{6}{7}$ with caudal).

Length (28158), $9\frac{4}{5}$ inches; D. XII, 16; A. III, 9; scales, 6–52–13.

Body ovate, compressed, the back rather strongly arched; anterior profile rather steep and straightish, gibbous between eyes and also behind them, slightly depressed above eyes and at the nape. Ventral outline considerably arched. Caudal peduncle moderate, about half as long as head, and somewhat longer than deep.

Head short and deep; deeper than long. Snout very short, blunt and thick, about one-third length of head. Mouth very small, the maxillary not quite reaching to the front of the eye, its length (from tip of snout) $3\frac{1}{4}$ in head. Teeth cardiform, in broad bands, the outer series enlarged, but smaller than in *P. pacifici*. Eye large, $3\frac{1}{2}$ in head, shorter than snout, about one-fourth wider than the broad preorbital. Lips thick. Chin with a median furrow and two pores; lower jaw included. Anterior nostril much larger than posterior. Preopercle rather weakly serrate, its upright limb somewhat concave. Gill-rakers short and weak, about 10 on lower limb of arch.

Scales rather large, arranged as in related species, those above the lateral line forming series parallel with the back, but placed so that the cross rows are very oblique. Soft parts of vertical fins almost entirely covered with small scales; series of scales also on membrane of pectorals and ventrals. Scaly sheath of vertical fins well developed.

Dorsal fin low, rather deeply emarginate, its spines very strong, the second spine slightly longer than the eye, and two-thirds the height of the third, which is but little shorter than the fourth or longest, and about two-fifths length of head; soft rays more than two-thirds height of longest spines. Caudal rather large, moderately forked, the upper lobe somewhat the longest, about four-fifths length of head. Anal rather low, its distal margin perfectly straight, vertical; second anal spine very robust, half length of head, half longer than the third spine, which is much lower than the soft rays. Ventral fins 1⅓ in head, about reaching vent. Pectoral fins long, subfalcate, a little longer than head, nearly or quite reaching anal.

Color in life, grayish-silvery above, with yellowish tinge; lower part of sides with indistinct darker streaks, formed by clusters of dark points on the margins of the scales. A faint dark bar, most distinct in the youngest specimens, extending from the region in front of the dorsal to, or a little below, the base of pectorals. In young specimens this bar is as wide as the eye, growing narrower below, but in the adult it is scarcely wider than the pupil. No trace of the black cross-bars seen in *P. dovii* and in *P. pacifici*, nor of the dark spots seen in *P. furthii*, nor of the lengthwise stripes of *P. bilineatus* and *P. virginicus*. Vertical fins and pectorals dusky yellowish; distal half of ventrals and base of anal blackish. Upper part of head dusky, especially between eyes. Lining of opercle pale, with yellow patches in life. Peritoneum white.

This species is known from three specimens (28158, 29632, and 28333), obtained in the harbor of Mazatlan. It was not seen at Panama.

The species of *Pomadasys* thus far known from the Pacific coast of tropical America may be readily distinguished by the characters given in the following table:

### ANALYSIS OF SPECIES OF POMADASYS FOUND ON THE PACIFIC COASTS OF MEXICO AND CENTRAL AMERICA.

- *a.* Anal fin short, its rays III, 7 to III, 10; dorsal fin deeply emarginate, its spines more or less robust.
  - *b.* Anal spines strong, the second longer and much stronger than third.
    - *c.* Soft dorsal and anal with series of scales extending on the rays; outer teeth in upper jaw enlarged.
      - *d.* Body ovate; back elevated; depth greater than length of head; outer teeth moderately enlarged, pointed; lips thick. (ANISOTREMUS* Gill.)
        - *e.* Scales above lateral line in oblique series, not parallel with the lateral line.
          - *f.* Scales rather small, 50 to 70 in a horizontal series.

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* = *Genytremus* Gill = *Paraconodon* Bleeker.

*g.* Color golden, with about seven light blue horizontal stripes, each edged above and below with paler; a dark band downward, and one forward and downward from nape; pectoral longer than head; second anal and third dorsal spines subequal, half head…………………………VIRGINICUS.*

*gg.* Color olivaceous; a jet black bar from anterior part of dorsal to below middle of side; base of pectoral, and membrane of opercle black; pectoral longer than head; second anal and fourth dorsal spines about equal, shorter than head………DAVIDSONI.†

*ggg.* Color olivaceous, the adult nearly plain, the young with two black longitudinal stripes; fins blackish; second anal spine longer than fourth dorsal, about half head…………………BILINEATUS.‡

*ff.* Scales large, about 7–34–12. Color grayish, each scale on upper anterior part of body with a blackish spot; fins more or less dusky; pectoral a little shorter than head; second anal spine robust, half length of head, longer than fourth dorsal spine. FÜRTHI.§

*ee.* Scales above lateral line in series parallel with the lateral line.

*h.* Dorsal spines rather low, the longest about half length of head; second anal spine half length of head.

*i.* Color plain grayish-silvery; a faint bar downward from nape; pectoral longer than head, about reaching anal; dorsal spines stout and short, two-fifths length of head; eye but half wider than the broad preorbital; dorsal rays, XII, 16……CÆSIUS.

*ii.* Color dusky grayish, with four irregular blackish cross-bands, which grow faint with age; pectorals much shorter than head, not reaching tips of ventrals; dorsal spines comparatively slender, half length of head; eye more than twice as wide as the narrow preorbital; dorsal rays, XI, 14. PACIFICI.‖

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* *Sparus virginicus* L. Syst. Nat. x, 1, 281, 1758=*Anisotremus tæniatus* Gill, Proc. Ac. Nat. Sci. Phila. 1861, 107, etc. *Habitat:* West Indies; Caribbean Sea; Brazil; both coasts of Mexico and Central America; Magdalena Bay (*Steind.*); Mazatlan (*Gilb.*); Panama (*Gill; Gilb.*).

† *Pristipoma davidsoni* Steind. Ichthyol. Beitr. iii, 6, 1875. *Habitat:* Southern California; Santa Catalina Island (*Jordan & Gilbert*); San Diego (*Steind.; Jor. & Gilb.*).

‡ *Pristipoma bilineatum* Cuv. & Val. v, 271, 1830 = *Pristipoma melanopterum* C. &V. v, 1830, 273 = *Genytremus interruptus* Gill, Proc. Ac. Nat. Sci: Phila. 1861, 256. *Habitat:* Both coasts of Mexico and Central America; West Indies; Peru; Brazil; San Diego (*Steind.*); Magdalena Bay (*Steind.*); Cape San Lucas (*Gill*); Gulf of California (*Lockington*); Panama (*Steind.*); Galapagos Islands (*Steind.*). Not obtained by Mr. Gilbert.

§ *Pristipoma fürthi* Steindachner, Ichthyol. Beitr. v, 4, 1876. *Habitat:* Mazatlan (*Gilbert*); Panama (*Steind.; Gilb.*).

‖ *Conodon pacifici* Günther, Proc. Zool. Soc. Lond. 1864, 147. *Habitat:* Chiapam (*Gthr.*); Panama (*Steind.; Gilb.*).

*hh.* Dorsal spines very high, the longest two-thirds length of head; second anal spine nearly two-thirds length of head; color grayish-silvery, with five jet black cross-bands; pectorals much shorter than head. Dovii.[*]

*dd.* Body oblong, the depth less than the length of the head; outer teeth much enlarged, blunt; preopercle very sharply serrate……………………(Conodon Cuvier.)

*j.* Color silvery, with eight dark cross-bands; snout not obtuse; second anal and fourth dorsal spines strong, half length of head; pectoral shorter than head; caudal lunate ……………Nobilis.[†]

*cc.* Soft dorsal and anal destitute of scales or very nearly so; form oblong; scales above lateral line in series parallel with the back.

*k.* Outer teeth in upper jaw slightly enlarged, acute. (Pomadasys.[‡] Lac.)

*l.* Dorsal spines 12; vertex convex; preorbital broad.

*m.* "Scales rather small (8–56–20); fourth dorsal spine 2¼ in head; second anal spine more than half head; pectorals not reaching vent; snout produced; coloration uniform"……………Humilis.[§]

*mm.* Scales larger (6–48–14); longest dorsal spine nearly half length of head, about equal to second anal spine; pectorals long, about reaching vent; snout sharp, protruding; color grayish, with four faint dark cross-bands..Macracanthus.[‖]

*ll.* Dorsal spines 13; vertex with a small but evident concave depression; head low; preorbital narrow.

*n.* Dorsal spines very high, the highest more than half length of head; color grayish-silvery, nearly plain ……………………………Branicki.[¶]

*kk.* Outer teeth in upper jaw not enlarged. (Pseudopristipoma Sauvage.)

*o.* Third dorsal spine produced, much longer than the others, and about half length of head; second anal spine somewhat shorter; profile convex; scales nearly smooth; pectoral very long, nearly as long as head; preopercle weakly serrate; color silvery; lower fins white; a distinct dark blotch on opercle, and a fainter one on sides below spinous dorsal .... ...... PANAMENSIS.*

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[*] *Pristipoma dovii* Günther, Proc. Zool. Soc. Lond. 1864, 23. *Habitat:* Mazatlan (*Gilb.*); Panama (*Gthr.*; *Gilb.*).

[†] *Perca nobilis* Linn. Syst. Nat. x, 1, 291 = *Conodon plumieri* Gthr. i, 304, 1859 = *Conodon plumieri* Streets Bull. U. S. Nat. Mus. vii, 50, 1877 = *Conodon antillanus* C. & V. v, 156, 1830. *Habitat:* Coast of Texas, West Indies, to Brazil. Recorded by Streets from Boca Soledad, Pacific coast of Lower California; not observed by other collectors.

[‡] = *Pristipoma* Cuv. & Val.

[§] *Pristipoma humile* Kner & Steindachner, Sitzsber. Akad. Wiss. Münch. 1863, 222. *Habitat:* Rio Bayano, Panama (*Kner & Steind.*); not seen by other collectors.

[‖] *Pristipoma macracanthum* Günther, Proc. Zool. Soc. Lond. 1864, 146. *Habitat:* Mazatlan (*Steind.*; *Gilb.*); Punta Arenas (*Gilb.*); Chiapam (*Günther*); Panama (*Gilb.*).

[¶] *Pristipoma branickii* Steindachner, Denkschr. Kaiserl. Akad. Wissen. Wein. xli, 28, 1879. *Habitat:* Tumbez (*Steind.*); Panama (*Gilbert*); Mazatlan (*Gilbert*).

*bb*. Anal spines weak, the second little, if any, longer or stronger than the third, and both lower than the soft rays; body oblong, not elevated; soft dorsal and anal rays with series of scales; scales above lateral line in series parallel with the back; color grayish, with light and dark stripes along the rows of scales, these often obscure.

(HÆMULOPSIS Steind.)

*p*. Pectoral fin long, nearly as long as head; a black blotch below in the axil, encroaching on the lower rays of the fin; preorbital broad, about as wide as eye.................... AXILLARIS.†

*pp*. Pectoral fin short, much shorter than head; axillary spot, if present, not encroaching on the fin.

*q*. Preorbital narrow, not so wide as eye; a round dark humeral blotch; anal spines very small, graduated ........................... NITIDUS.‡

*qq*. Preorbital very deep, wider than eye; anal spines not graduated .................. LEUCISCUS.§

*aa*. Anal fin long and low, its rays III, 11 to III, 13; dorsal fin low, scarcely emarginate, its spines slender; anal spines small, graduated; scales small, those above lateral line in oblique series ... (ORTHOPRISTIS Gill.‖)

*r*. Dorsal spines 12; soft parts of dorsal and anal naked; preorbital very deep, as deep as eye; scales small, about 8–60–15.

*s*. Body oblong-ovate, the depth considerably more than one-third length; profile from nape, straight or slightly concave; pectorals long, 3⅓ in body; body brownish above, with faint dark cross-bands and oblique pale streaks.

CHALCEUS.¶

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*[*] *Pristipoma panamense* Steindachner, Ichthyol. Beitr. iii, 8, 1875. *Habitat;* Mazatlan (*Gilb.*); Panama (*Steind.; Gilb.*).

[†] *Pristipoma axillare* Steindachner, Ichth. Notiz. viii, 7, 1869. *Habitat:* Mazatlan (*Steind.; Gilbert*).

[‡] *Pristipoma nitidum* Steindachner, Ichthyol. Notiz. viii, 5, 1869. *Habitat:* Mazatlan (*Steind.; Gilb.*); Panama (*Gilb.*).

[§] *Pristipoma leuciscus* Günther, Proc. Zool. Soc. Lond. 1864, 147. *Habitat:* Lower California (*Streets*); Mazatlan (*Gilbert*); San José (*Gthr.*), Chiapam (*Gthr.*), Panama (*Gthr.*). Two of our Mazatlan specimens of this species agree with Dr. Günther's description and figure, in having the anal spines rather large, the second larger than third, 2⅓ in length of head; the remaining specimens from Mazatlan and Panama are slenderer, with more pointed snout and deeper suborbital, the anal spines being quite small, the second 3½ to 4 in head. These perhaps represent a different species or variety, but we are not prepared to give it a separate name.

[‖] = *Microlepidotus* Gill = *Pristocantharus* Gill.

[¶] *Pristipoma chalceum* Gthr. Proc. Zool. Soc. Lond. 1864, 146 = *Pristipoma kneri* Steind. Ichth. Notiz. viii, 1869, 3. *Habitat:* Mazatlan (*Steind.; Gilb.*); Panama (*Gthr.; Gilb.*).

*ss.* Form oblong-elliptical, the depth less than one-third length; profile slightly convex; pectoral short, 4½ in body; sides with longitudinal dark streaks .................. CANTHARINUS.*

*rr.* Dorsal spines 13 (or 14); soft parts of dorsal and anal scaly; preorbital very narrow, its width much less than diameter of eye; pectoral long, as long as head, 3½ in body; scales very small; color grayish, with narrow oblique dark streaks .................. INORNATUS.†

INDIANA UNIVERSITY, *January* 3, 1882.

# THE RAPID PREPARATION OF LARGE MYOLOGICAL SPECIMENS.

## By M. FÉLIX PLATEAU,

*Professeur à l'Université de Gand.*

(Read before the "Association Française pour l'avancement des Sciences," Congrès de Reims, 1880. Séance du 13 Août, 1880.)

[Translated by H. C. Yarrow, M. D., for the Smithsonian Institution, Washington.]

The laboratory of comparative anatomy of the University of Gand is of restricted dimensions. Its surroundings, sufficient for elementary practical teaching, are very modest, but, happily, material for study is not wanting, thanks, above all, to the administration of the Zoological Garden of Antwerp, one of the richest of the continent, which generously donates to us its losses and carries the obligation still farther in sending to us the bodies of animals by express. It is thus that during the academical years of 1879 and 1880 we have had at our disposal a series of very rare monkeys, a kangaroo, a cheetah or hunting leopard, a young American ostrich, the principal viscera of an adult African elephant, and other interesting specimens.

With the assistance of a single helper I have been able to utilize all these objects and rapidly prepare, during the few hours which my other duties leave me, a great number of permanent anatomical preparations to enrich our museum, which is already comparatively complete.‡ Our collections being relatively poor in preparations of the muscular system, I have above all endeavored to fill this want. We have, indeed, made many preparations of the entire muscular system of animals of medium size.

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* *Pristipoma cantharinum* Jenyns, Zool. Voy. Beagle, Fishes, 49, 1842. *Habitat:* Guaymas (*Lieut. Nichols*); Galapagos Islands (*Jenyns; Gthr.*).

† *Microlepidotus inornatus* Gill, Proc. Ac. Nat. Sci. Phila. 1862, 256 = *Pristipoma brevipinne* Steind. Ichthyol. Notiz. viii, 1869, 10 = ? *Pristipoma notatum* Peters, Berlin. Monatsber. 1869, 706. *Habitat:* Cape San Lucas (*Gill*); Mazatlan (*Steind.; Peters*). Not obtained by Mr. Gilbert.

‡ The collections at Gand actually contain more than 3,000 preparations belonging properly to comparative anatomy, and more than 1,600 specimens are preserved in alcohol.

As the solution of this problem, *i. e.*, how to make rapidly and at a trifling cost, in a laboratory of second rank, large permanent myological preparations might interest professors of comparative anatomy and zoology, I have thought it best to briefly relate the method which I have employed.

Having a horror of dried and varnished preparations, I have endeavored to prepare muscular specimens with phenolized glycerine, easily handled, and which could constantly serve for demonstration. With us the muscles are red, the tendons white; in a word the uninitiated would believe that they saw the fresh muscle.*

In order that I may be well understood I will give a *résumé* of the easy operations to which we have subjected a very large monkey, the *Cynocephalus sphinx*, in order to prepare the whole of its muscular system.

The animal being skinned, care being taken of the superficial muscles or muscles of the skin, the abdomen having been split longitudinally and the viscera removed, it was first of all necessary to preserve this specimen from decomposition, and to employ a process which would permit us to dissect all the muscles at our pleasure.

It is impossible to use alcohol for animals of this size; the body is simply plunged into a saturated solution of the alum of commerce. The muscles in a short time are capable of being indefinitely preserved, and all the conjunctive elements, aponeuroses, tendons, sheathes of the nerves, &c., acquire a firm consistence and become very white.

Whenever the specimen is required for dissection it is taken from its bath, and when the work is over it is replaced.

We have thus been able to dissect at our leisure all the muscles of the *Cynocephalus*, continuing the labor for at least ten days.

Having finished the dissection, it becomes necessary to impart to the muscles their original color. It is in this operation that I employ, and always successfully, the process which I have exemplified since 1874, and which is based on the property that carmine presents, viz, in forming when in the presence of alum an insoluble red laquer.†

The animal having been dissected and taken out of the bath, is plunged in pure water for twenty-four hours; this is done in order to get rid of the excess of alum.

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* Our scholars are generally deceived up to the very moment when we explain to them the mode of preparation.

† Note on a process for giving or imparting the red color to muscles preserved in alcohol.—(*Bulletin de l'Academie Royale de Belgique, 2<sup>e</sup> série, tome XXXVIII, Nos.* 9 *et* 10, 1874.)

Pure powdered carmine, a little chrome yellow, and liquor of ammonia are the only substances necessary. The carmine is deposited on an earthenware dish; the ammonia is employed as water is by the water-color painter, and traces of chrome yellow correct the tints which are too purple. Finally, the white surface of the plate serves as a background on which the tints may be criticized.

The muscles of the specimen are painted with the aid of an ammoniacal solution of carmine, taking the precaution not to cover the tendons or bones, and in general those parts which should remain white. In fact, these parts are protected by wrapping them separately in strips of tolerably thick paper.

It is unnecessary for me to recall the fact that carmine tints the muscles and penetrates them to a certain depth.

This operation finished, it is next in order to fix the tint. For this purpose the specimen is simply replaced in the bath of alum. An insoluble red laquer is formed, constituting two coats, the one superficial and pulverulent (this comes from the bottom of the liquid), the other penetrating much deeper into the muscular tissue itself and remaining fixed in the tissue.

From this time forth the carmine is fixed and the muscles are red, having the appearance of fresh flesh, and may be handled for an indefinite period without soiling the fingers of the operator with their coloring matter. Specimens which we thus prepared in 1872, have been used every year in the comparative anatomy course, and have lost nothing of their value.

The next step is the employment of glycerine. The specimen is plunged into a bath of phenolized glycerine, but, as the alum has already rendered the specimen proof against decomposition, a long maceration is unnecessary, eight days being a sufficient length of time.

Finally, to place the specimen in a definite condition. It is well known how annoying ordinary preparations are in which glycerine has been used, it being necessary to let them drain for several months. Here we have employed a more expeditious method. After having allowed the specimen to drain for some hours, we wrap the members of the animal and the trunk, in fact the entire body, in a covering of white filtering paper, then in many coverings of ordinary gray paper, around the whole of which twine is wound.

One week after, the paper, which has absorbed all the glycerine in excess, is taken off, the abdomen is filled with packing, the body is sewn up, the muscles are restored to their proper position, and the specimen is finished.

Thanks, probably to the alum, the tendons are white and not yellowish, as preparations are when made by ordinary processes. The muscles are never found to be glued together.

To state it briefly, the method is composed of the following operations: 1st, maceration in alum during the dissection; 2d, washing in pure water; 3d, tinting with carmine;. 4th, the fixing of the carmine by alum; 5th, maceration in phenolized glycerine; 6th, getting rid of the excess of glycerine by compression between pieces of absorbent paper.

This is the whole of the process which is warranted by known facts; it is quite inexpensive, simple, and expeditious.

As an example of the rapidity of execution I will cite the following fact: On May 23, of this year, an adult African elephant died in the Zoological Garden of Antwerp. One month after that event we displayed, in one of the exhibition cases of the National Exposition of Brussels the enormous heart of this animal prepared by the above-detailed method.

## ON THE CHINNOOK NAMES OF THE SALMON IN THE COLUMBIA RIVER.

### By SILAS B. SMITH.

[NOTE.—The following notes were contributed by Mr. Silas B. Smith, a lawyer, at Skipanow, Wash., and a half-breed Chinnook, in answer to questions asked by Mr. Charles J. Smith, of Brookfield, Wash. As the Chinnook names have a considerable place in our Salmon literature, it seems very desirable to place the facts given by Mr. Smith on record. I give the present accepted names of the different species in foot-notes.—D. S. J.]

The Chinnook names for the different varieties, following the order given by you, are as follows:

1st. Chinnook Salmon,* "*E-quinna*" (accent second syllable and give the "*a*" the broad sound).

2d. Blue-back,† "*Oo-chooy-ha*" (accent first syllable and give the broad sound to "*a*").

3d. Silver-side,‡ "*O-o-wun*" (accent first syllable). Your next is "Dog Salmon (red)." My mother and all the other Indians I have spoken to on the matter, and some of the whites, maintain that the red-skinned salmon with hooked nose or beak is nothing more or less than the male silver-side, having turned red after inhabiting fresh water, and his nose assuming that shape upon its becoming poor.

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* *Oncorhynchus chouicha* (Walb.) J. & G. This word "E-quinna" is evidently the "*quinnat*" of Richardson.

† *Oncorhynchus nerka* (Walb.) G. & J.

‡ *Oncorhynchus kisutch* (Walb.) J. & G.

They say that there is another species of Salmon that comes in the fall, having transverse dark spots, large teeth, and nose largely curved, but it does not turn red or but little at most. I will give the name and consider it in place of the "Dog Salmon."

4th. Spotted Fall Salmon,* "*O-le-arah*" (accent on first syllable).

5th. Steel-head,† "*Quan-nesho*" (accent last syllable).

I have been unable to give the right sound in English to the last syllable of the last name. The above is as near as I can make it.

There is another salmon which you did not mention. It comes in the last of the summer run; it is as large if not larger than the spring salmon, but of a darker color and not so fat.

It will make number—

6th.‡ "*Ek-ul-ba*" (accent first syllable).

## REMARKS UPON THE OSTEOLOGY OF OPHEOSAURUS VENTRALIS.

### By Dr. R. W. SHUFELDT, U. S. A.

(Read before the Biological Society of Washington, D. C., December 23, 1881.)

Guided, to a great extent, by external characters, modern herpetologists, in the arrangement of our American reptiles, have assigned this lizard to the genus, *Opheosaurus*, of the family *Anguidæ*, of the suborder *Diploglossa*. This arrangement brings it very near the genus *Gerrhonotus*, a lizard with which I have osteologically compared it. The external characters are referred principally to the form and disposition of the scales, the presence in *Gerrhonotus* of a ventral line, and the position of the external ear.

*Opheosaurus ventralis* inhabits the entire Austroriparian region, Tennessee, Kansas, and several of the Middle States. It is found lurking in the woods in damp places, frequently burrowing under ground, and is at all times a gentle and harmless lizard. We all know that in common parlance *Opheosaurus* has been termed the Glass Snake, from the fact that when a moderate blow is delivered it, it usually parts with a portion of its tail, the fracture sometimes taking place at one or more points. These ruptures, and they always occur from violence, are invariably postanal, and the part lost is susceptible of reproduction from the locality at which the fracture took place in the lizard's body. Interesting as this part of the natural history of our subject is, it does not rightfully come within the limits of a paper devoted to its osteology, and I will be obliged to dismiss this characteristic in *Opheosaurus* here by simply calling the attention of the student to the fact that, as far as my studies have carried me, it appears that true caudal vertebræ are never reproduced in the new tail, be it only a portion or the entire appendage is lost, but in their place we have substituted a series of semi-osseous nodules, that eventually form the bony core to the new part.

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* *Oncorhynchus keta* (Walb.) G. & J.

† *Salmo gairdneri* Rich.

‡ *Oncorhynchus chouicha* (Walb.) J. & G. (Fall run: "Ekewan" of Richardson.)

The opportunity has not been afforded me to enter very extensively into the occurrence of bone in the exoskeleton of this lizard, but Professor Owen tells us (Anat. of Verts., vol. i, p. 555) that "bone is developed at the base of the scale, forming part thereof, or combining scute and scale, in *Ophisaurus*, *Tribolonotus*, and *Trachysaurus*." We may add to this that there certainly seems to be more or less bone tissue, be it semi-osseous or otherwise, in the tough and brittle plates that overlie the true skull, superiorly. It requires but a very superficial examination of the skull of this snake-like lizard to satisfy the zoötomist that he has before him a creature that, so far as this part of its bony framework is concerned, at least, makes a very near approach to the typical Lacertilian, an indication that is more than likely to be carried out in other parts of its anatomy.

We find the occipital condyle to be uniform in outline, being notched above, with its long axis placed transversely; it stands out quite prominently from the lower margin of the elliptical foramen magnum, which in turn has its long or major axis parallel with the axis of the condyle; prominent though this latter may be, it cannot be said to be pedunculated, but really is sessile, its prominence being greatly due to the segments that support it. The part that the basi- and exoccipitals took in its formation is plainly indicated even in the adult by delicate little furrows that mark the boundaries of the original segments.

This condition of the condyle obtains in many of our American lizards, notably in *Gerrhonotus* and in *Sceloporus* and kindred forms among the *Iguanidæ*. Substantial protection is afforded the brain below by the perfect union that has taken place among the bones of the basis cranii, the basisphenoid, basioccipital with the exoccipitals, which latter support tuberous and outstanding paroccipitals. On the other hand, the anterior wall of the brain-case depends solely in the living animal upon thin membranous partions for the defense of the encephelon, the representatives of the ali- and orbitosphenoids. This open space in the articulated cranium is bounded below by the basisphenoid and laterally by the parotic on either side. Above we again find the brain completely guarded by osseous plates, which here are the united parietals, that in turn become indistinguishably amalgamated with the large superoccipital. Mesiad, the united parietals anchylos with the parotics of the brain-case, while anteriorly these bones articulate suturally with the hinder borders of the frontals; no parietal foramen ever existing at this point as found in some lizards. Laterally, each parietal is extended backwards in a diverging limb, that on either side articulates throughout its entire margin with the squamosal overlapping the latter at its termination and abutting against the lateral process of the occipital. In their course these wings of the parietals bend downwards by a gentle curve, which is more abrupt in the shorter skull of *Gerrhonotus*.

The interfrontal suture is persistent, and these bones form the mid-plates at the top of the skull; taken together the plate is narrower behind than it is in front, where it meets the nasals, while on either side it articulates with the lacrymal and postfrontal; a limited portion of this margin being free, it enters into the formation of the superior moiety of the periphery of the orbit. In our *Holbrookia maculata* among the *Iguanidæ* we find this interorbital portion of the frontal plate crowded to a mere osseous and median line by the immense orbits. The nasals have united medially just as the frontals have, and they, being now anteorbital, are allowed to curve downwards on either side to meet the maxillaries, while anteriorly they form the upper and posterior margin of either nostril, and receive between them in the middle line the posterior process or nasal process of the premaxillary. This latter bone forms the rounded anterior end of the skull; it also completes the nostril in front and below, this subcircular aperture having its border or periphery eventually made entire by the assistance of the maxillary on either side, it filling in the lower and posterior part. This portion of the skull is formed in a like manner in *Eumeces*, but in this genus the termination of the cranium anteriorly is more acute, being blunter and broader in *Gerrhonotus scincicaudus*. We will complete this view of the cranium by calling attention to the longitudinal foramen that exists anteriorly between the squamosal and parietal on either side.

The lateral aspect of the skull (Fig. 1) presents for examination quite a number of interesting points. We have, posteriorly, a free *os quadratum* that stands as a protecting pillar at the portals of the auditory meatus. This bone has a quadrilateral outline in front, nearly flat, while behind it is deeply concave throughout its length, and supports below an oblong facet, placed transversely for a similar shaped articulating surface on the lower maxilla. Above it is very much expanded, antero-posteriorly, the hinder part of which surface is occupied by the end of the squamosal. This form of the *os quadratum* (*o. q.*, Fig. 1) obtains in *Gerrhonotus* and *Eumeces*, and in fact seems to be but slightly departed from by the vast majority of our lizards. Between the anterior boundary of the *os quadratum* and the posterior boundary of the orbit, and the arching squamosal above that meets both points, there is exposed to view in the skull of this lizard, and, I believe, in all of its congeners, through an open space here existing, the delicate

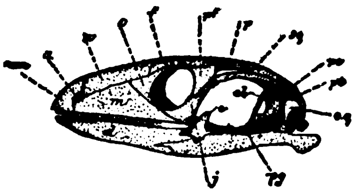

Fig. 1.

little *columella* (*cl.*, Fig. 1), that has its superior end abutting against the under surface of the parietal, while its lower rests in a circular socket intended for it, on the upper surface of the middle of the pterygoid. Its lower articulation is anterior to its upper, *i. e.*, the bone leans backwards.

In all of the American lizards that I have examined this bonelet is constant, and Professor Huxley tells us in his Anatomy of Vertebrated Animals, page 219, that "In the principal group of the *Lacertilia*, a column-like membrane bone, called the *columella* (but which is not to be, by any means, confounded with the *stapes*, to which the same name is often applied in reptiles), extends from the parietal to the pterygoid on each side, in close contact with the membranous or cartilaginous wall of the skull. Hence they have been called "*Kionocrania*" or "column skulls."

Through this open space we also have lateral views of the pterygoids and the basisphenoid with the parotic and pro-otic bones above and immovably articulated with the latter. There seems to be a small separate ossification wedged in between the squamosal and parietal behind, articulating with the exoccipital and *os quadratum*, that seems to correspond with Professor Huxley's *pterotic*. In the dried skull it is not movable.

The orbit is bounded by three bones: above by the frontal, as already described; anteriorly by the *lacrymal*, that articulates with the jugal by a descending process, anteriorly with the maxillary, nasal, and frontal; while the *postfrontal* and *jugal* bound its posterior moiety, the former bone articulating above with the frontal and parietal, below and posteriorly with the jugal and squamosal, and the latter, the *jugal*, by its anterior process with the lacrymal, by its posterior with the postfrontal and squamosal; thus we see that the orbital periphery is complete. The skull is completed laterally by the *maxillary;* this bone bears teeth in its alveolar process below, articulating with the bones that go to form the roof of the mouth internally, while, upon the aspect of the skull we now have under consideration, it articulates behind with the lacrymal and jugal, above with the nasal, anteriorly with the premaxillary.

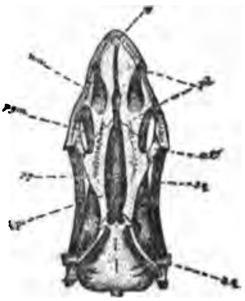

Fig. 2.

The prefrontal fulfills its customary function in constituting in part an osseous septum narium, meeting the ordinary segments as they are arranged in the Lacertilian skull.

Passing to the base of the cranium (Fig. 2), we find the basisphenoid giving off, near its anterior termination, or the base of the rostrum in some vertebrates, on either hand, well-developed *pterapophysial processes* that have dilated extremities to articulate with longitudinally-elongated facets upon the pterygoids. These latter bones form one of the principal features of the basis cranii; they extend backwards, converging outwards from the points where they articulate with the processes of the sphenoid, to articulate by movable joints at the anterior and lower angles of the quadrate bones; anteriorly they develop horizontal plates that articulate in front with the palatines, laterally by a process that, on either side, meets the *os transversum*. Their upper surfaces form the greater part of the floor of the orbit, while on their under surfaces they present for examination on either bone a longitudinal row of minute conical teeth, the row being double behind and produced anteriorly so that a few of them are found upon the palatines beyond. The palatines complete the roof of the mouth distally, leaving between them quite an extensive palatine fissure that ceases when it meets the vomer where that bone dips down to lend its aid in establishing the septum narium. A palatine starting from the oblique pterygoidal articulation proceeds forwards by a rather broad horizontal plate that, as it comes opposite the maxillary, throws off an external and lateral process to meet that bone and close in the "nasal aperture" behind; it then turns inwards to the commencement of the palatine fissure, to proceed by a much broader plate that bounds the nasal aperture internally, and only terminates by quite an extensive articulation with the maxillary laterally, and with the premaxillary and vomer anteriorly, curling outwards to complete the aforesaid nasal vacuities. On either side an *os transversum* is found; this little bone is wedged in between the maxillary and jugal on its outer side, while it articulates with a process coming from the palatine on its inner, thus forming quite an important element in completing the floor of the orbit and the base of the cranium.

The bones are arranged at the base of the cranium and roof of the mouth, in nearly all lizards, so as to encircle and bound certain foramina or vacuities; these have been described by Owen and named by that distinguished anatomist as, first, the "interpterygoidal vacuity," the largest of all, a mesial, open, elliptical space in our subject bounded by the pterygoids and palatines laterally, the basisphenoid behind, and continuous with the palatine fissure anteriorly; the next, being parial, are the "pterygo-maxillary" vacuities; these occur on either side, and are bounded laterally by the maxillary and os transversum, internally by the pterygoid and palatine; while, finally, we have the "nasal apertures," bounded on their outer sides by the maxillaries, behind and internally by the palatines. In *Gerrhonotus*, the skull being broader, these apertures are consequently wider; otherwise the general arrangement of the bones at the base of the skull is the same. In examining the eye, we discover the *sclerotals* to be present, as they are in *Aves*. They are quadrate in outline, slightly overlapping each other, and number from eighteen to twenty in the average number of specimens examined.

The rami of the lower maxilla are turned outwards, so that the alveola processes are the most external; this condition is so much increased after we pass the coronoid bones that the sides of the jaw become nearly horizontal. They terminate by quadrate plates that tend to approach the median plane, these horizontal plates protruding in the articulated skull back of the articular facets and the quadrate bones. Broadly oblong, and raised above the general level of the bone, the articular facets look upwards and a little backwards and outwards. The *coronoid bones* are placed, one on either side, slightly posterior to the middle point of the ramus; they project upwards and backwards as laterally-compressed processes that show externally still fairly-developed traces of their original sutures; upon this aspect, also, we observe the irregular sutural line, indicating the point of ending of the dentary portion of the maxilla.

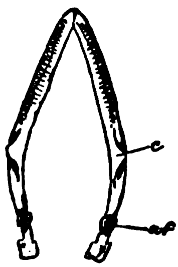

Fig. 3.

Each ramus is perfectly smooth beneath, being gently convex from side to side, broadly so longitudinally. The external curve about the symphysis is parabolic in outline, the inner being sharply acute, and, passing backwards as the inferior ramal border, maintains a more or less parallel position with the external or alveolar border. Anchylosis is never thoroughly established between the dentary elements at the symphysis, this joint having an articulation very similar to the symphysis pubis of anthropotomy, the interested bones coming apart upon very slight provocation in the dried skeleton, showing each articular face to be roughened for an amphiarthrosial joint.

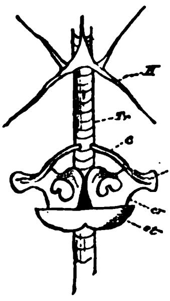

Fig. 4.

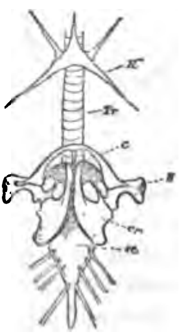

Fig. 5.

In the specimens that I have examined, the teeth in the upper jaw seem to invariably pass completely round the alveolar process, while in the lower jaw a few always seem to be lacking on either side of the symphysis; this is also the case in *Gerrhonotus*, but not so in a specimen of *Eumeces skiltonianus*. These teeth are of the *pleurodont* type; in other words, they are anchylosed to an outer alveolar plate, as in many of the *Iguanidæ*. Above their points of union to the alveolar process they are conical in form, pearly white, and glistening, being arranged in a row of some seventeen to twenty in each ramus, the largest being found in the middle and the smallest at either end. The *hyoidean arch* seems to be largely cartilaginous in structure, though a good deal of bone tissue does exist in it, particularly about the center. In form it resembles the capital letter X, the upper limbs being directed forwards and outwards, the hinder ones backwards and outwards; the body of the hyoid occupying the intersection as an equilateral triangle, with one of the angles placed anteriorly in the middle line, and from which is produced a delicate "glosso-hyal"; the posterior limbs springing from its outer angles, and the anterior ones, apparently by articulation, from midpoint of its sides. *Gerrhonotus* has a hyoidean arch very similar to the one found in *Opheosaurus.*

In the largest and best specimen that was examined, there were found 147 vertebræ with a series of caudal nodules where a tail had been replaced; there were 52 pairs of ribs, and this number was also found in a smaller specimen. The atlas is characteristic of the usual Lacertilian type, and a stumpy odontoid process is found upon the axis. Free vertebral ribs are not exhibited until we have passed backwards for three or four segments, but when the series commences it is continuous to within one vertebra of the rudimentary pelvis, and even this intervening segment may develop a small free pleurapophysis. These ribs have rounded bodies with laterally compressed and dilated extremities below; the pair when articulated lie in the curve of a broad ellipse that sustains the shape of this lizard's body. They articulate by feebly developed capitula, at the base of the diapophyses, at the very anterior margin of the centrum of each vertebra, in concave facettes placed there for their accommodation. Commencing with the atlas, the first two or three vertebræ support hypapophyses, that are at first directed downwards, then directly backwards in a sharp point; it is with this segment, too, that the quadrate neural spine makes its appearance, to be continued throughout the chain, past the pelvis; to become directed more and more backwards, and more pointed as we pass through the caudal series.

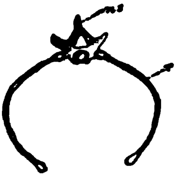

Fig. 6

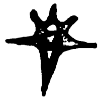

Fig. 7.

Well-developed pre- and post-zygapophyses are found upon the neural arches of all of the vertebræ, and the cup and ball socket between the centra is ellipsoidal in form and placed transversely on the bone, being concave in front, convex behind. The neural tube, beginning more or less triangular, becomes subelliptical as we pass posteriorly. Caudal vertebræ develop sharp, spine-like diapophyses, that are directed outwards at right angles with the neural spines and the chevron bones below, which latter in these segments are in each case a wedge-formed hypapophysis, attached to each vertebra, the triangular hæmal canal passing through them all. The *sternum* and *scapular arch* in *Opheosaurus* is largely cartilaginous, though bone tissue is deposited about the points, where in the higher lizards the glenoid cavity exists, and other localities where additional strength is required. So far as my examinations have extended I have thus far failed to discover the presence of a rudimentary pectoral limb; even the very semblance of the glenoidal socket appears to be missing. The clavicles do not meet in the median line, but their outer extremities articulate with the expanded blade of the scapula on either side, which latter bone is semiosseous only. A transverse plate, covering the lower borders of the coracoids, is the sole representative of a sternum. The entire apparatus is placed immediately over the trachea, while the outer and expanded blades of the scapulæ lap over the first and second pleurapophyses.

Taken as a whole we could hardly look for a better example of a rudimentary apparatus throughout, even to its minor details. In *Gerrhonotus*, all of the points that are so feebly developed in *Opheosaurus* have been carried to a still higher point, and one approaching the true Lacertilian type, and although in this lizard the anterior and posterior limbs are present, they are weaker than in other forms, such as the *Iguanidæ*. In *Gerrhonotus* the clavicles meet mesiad, and the coracoids articulate with elongated facets upon a semi-osseous sternum, that has inserted along its sides the hæmapophyses that articulate above with the dorsal ribs. Passing next to the examination of the pelvis, we find that although some parts have been more or less suppressed or have almost passed beyond recognition, we still find a rudimentary femur present. The fifty-seventh vertebra has suspended from its diapophyses, and articulating freely with their extremities, two spoon-shaped bones, one on either side; these do not meet in the median line, but are separated by a space of several millimeters. The dilated extremity of each is below, and from the middle point on the outside surface, rotating in a diminutive acetabulum, we find the rudimentary femur, represented by a minute cylinder of bone, rounded at both extremities. A faint sutural line passing through this cotyloid-cavity indicates the division between the ilium above and the puboischium below. Professor Mivart found this condition in some of the forms he examined, and he tells us in his Lessons in Elementary Anatomy, page 195, that "confining ourselves, therefore, for purposes of comparison, to Mammals, Sauropsida, and Batrachians, we find the femur under a certain aspect more constantly present than the humerus. For although it is often absent when the humerus is present (as in forms like Siren, which have pectoral limbs but no pelvic ones), yet it is sometimes present in a more or less rudimentary condition when no representative of the foot coexists with it. Such is the case, *e. g.*, in some whales (as the Greenland whale) amongst mammals, and certain snakes, *e. g.*, *Boa*, and certain lizards, *e. g.*, *Lialis*, amongst the reptiles."

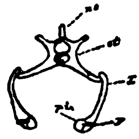

Fig. 8.

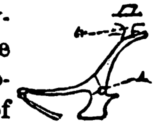

Fig. 9

In *Gerrhonotus* all three of the pelvic bones go to form the acetabulum, the pubic elements curving far anteriorly as delicate osseous columns to meet, mesiad, in a common cartilaginous articulation. The arch is suspended in a like manner from the transverse processes of a vertebra.

Though a little foreign to our subject, it will be of interest to many to know something of the character of food of this lizard, and in this Professor Riley has kindly assisted me, and sends the following diagnosis of a stomach that I sent him:

"The contents of stomach of *Opheosaurus ventralis* consists almost entirely of fragments of a tolerably common spider, *Lycosa ruricola* Hentz, with a single small black seed and seed-pod of some plant, not determinable on account of condition."

Dr. Vasey kindly examined the seed and thinks it may be a *Heliocharis*, but is not certain. Unfortunately, the writer has not had the opportunity, from lack of material, of examining such a form as *Barissia olivacea*, a lizard that Cope has placed as the leading genus under *Gerrhonotidæ;* as far as our examination has gone, however, of forms representing other genera, it should leave no doubt as to the soundness of the classification in placing our apodal *Opheosaurus* in the niche it now occupies.

## EXPLANATION OF FIGURES.

FIG. 1.—Left lateral view of skull of *Opheosaurus ventralis*, life size: *pm.*, premaxillary 1, nostril; *n.*, nasal; *m.*, maxillary; *l.*, lacrymal; *f.*, frontal; *pf.*, postfrontal; *p.*, parietal; *sq.*, squamosal; *po.*, pro-otic; *pt.*, pterotic; *o. q.*, *os quadratum;* *cl.*, columella; *c.*, coranoid; *d.*, dentary; *j.*, jugal; *pg.*, pterygoid.

FIG. 2.—Skull of *Opheosaurus ventralis* seen from beneath, taken from a smaller specimen than Fig. 1, and enlarged: *v*, vomer; *pl.*, palatine; *o. t.*, *os transversum; sq.*, squamosal; *o. q.*, *os quadratum; n. a.*, nasal aperture; *pgm.*, pterygomaxillary vacuity; *pg.*, pterygoid; *ip.*, interpterygoid vacuity.

FIG. 3.—Lower jaw of *Opheosaurus ventralis*, life size, same specimen as Fig. 1, seen from above: *c.*, coronoid; *a. f.*, articular facet.

FIG. 4.—Hyoid and scapular arch of *Opheosaurus ventralis*, life size, seen from in front: *H*, hyoid; *Tr.*, trachea; *c.*, clavicle; *s.*, scapula; *cr.*, coracoid; *st.*, sternum.

FIG. 5.—Same from *Gerrhonotus scincicaudus*, letters indicate the same thing: *gl. c.*, glenoid cavity.

FIG. 6.—Anterior view of vertebra, with its ribs, from *Opheosaurus ventralis*, from middle of spinal column; *n. s.*, neural spine; *r.*, rib.

FIG. 7.—Anterior view of caudal vertebra from same specimen.

FIG. 8.—Anterior view of vertebra that bears the pelvic arch, *O. ventralis*, slightly enlarged: *n. s.*, neural spine; *ct.*, centrum; *I.*, ilium; *p. i.*, pubo-ischium; *F.*, rudimentary femur.

FIG. 9.—Sketch of lateral view of pelvis of *Gerrhonotus scincicaudus*, slightly enlarged: *tr.*, transverse process of vertebra; *A.*, acetabulum.

# ON CERTAIN LIMPETS AND CHITONS FROM THE DEEP WATERS OFF THE EASTERN COAST OF THE UNITED STATES.

### By W. H. DALL.

I have received from Professor Verrill certain limpets or patelliform shells and chitons collected under his supervision off the southeast coast of New England in deep water by the United States Fish Commission parties in 1881, with his kind permission to describe them. Though without particular beauty and of small size, the hope that these specimens would prove of interest has not been disappointed.

Limpets are generally shore or shallow water mollusks; the connection of certain peculiarities of structure in them with their geographical distribution, and the progressive development indicated by the characters of different genera, have already been the subject of comment by me.*

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* Sci. Results of the Expl. of Alaska, I, art. II, pp. 41–43, 1876.

The forms of lowest organization and least specialized characters among those already known are those which inhabit the deeper water; hence there was reason to suppose that features of much interest would be exhibited by the few specimens which had just been brought up from much greater depths than any from which limpets had hitherto been obtained.

The examination was rendered more complete by the possession of additional specimens which are contained in the deep-sea collection from the Antilles made by Prof. Alex. Agassiz and Lieutenant-Commander Bartlett, U. S. N., on the United States Coast Survey steamer Blake. These afforded valuable confirmation of impressions derived from the study of the material obtained from Professor Verrill.

Some of the specimens obtained are of unusual interest as showing a combination of characters which has heretofore been unknown in animals of the same order. While the shells present few salient features, the soft parts show extraordinary and unexpected characters. They are divided into representatives of the orders *Rhiphidoglossa*, *Docoglossa*, and *Polyplaciphora*. The *Docoglossa* comprised representatives of both the suborders *Abranchiata* and *Heterobranchiata*, but all somewhat anomalous in their characters. It is in the first-mentioned order, however, that the richest results were obtained, since it appears necessary to separate the three species obtained into two genera, representing each a family, which differs by apparently sound characters from any hitherto known, and which it has therefore been necessary to describe as new.

Almost all the species appear to be blind.

## Order RHIPHIDOGLOSSA.

### Family COCCULINIDÆ Dall.

Shell patelliform, not nacreous, symmetrical, with an entire non-sinuated margin, and a posteriorly inclined apex with a deciduous spiral nucleus. Muscular impression horseshoe-shaped, interrupted over the head.

Animal with a prominent head and muzzle, two tentacles as in *Lepetidæ;* gill single, plumose, asymmetrical, resembling that of *Acmæidæ*, extending between the under surface of the mantle and the foot (from a point above and behind the head) backward on the right side, attached only at its base. Anus anterior, opening above and behind the head. Mantle margin plain; sides and margin of the foot without papillæ or ornamental processes excepting two filaments, one on each side of the median line, between the mantle and the foot-disk behind. Radula with a small or moderate rhachidian tooth (in the known species), three inconspicuous laterals with denticulate cusps and a fourth dentate, larger outer lateral;* uncini numerous (50–150), similar, hooked at the tip, those of each lateral series springing from a common base.

Formula: $\dfrac{1}{m\,(1+3\cdot 3+1)\,m}$.

This family differs from its nearest described allies (the *Fissurellidæ*) in its single asymmetrical gill, in the absence of appendages to the sides of the foot or on the mantle edge, and in its patelliform, unfissured, unsinuated, and wholly external shell.

From the succeeding family, *Addisoniidæ*, it is separated by its symmetry, the character of the gills, and by its dentition. By its dentition it is most nearly allied to *Parmophorus* or *Scutus*, if figures be taken as a criterion (and much resembles some species of *Helicina*), but it must be borne in mind that very few species of *Fissurellidæ*, have been figured in proportion to the whole number known. The other characters, however, forbid its incorporation with the *Fissurellidæ* as they conflict in nearly every important feature with the definition appropriate to that family.

At first it was thought that *Propilidium* might be incorporated in this family, but an examination of the available data relative to that genus indicates that it belongs rather in the *Fissurellidæ*, where it, apparently, represents an imperforate *Puncturella*.

### Genus COCCULINA Dall.

Animal blind; shell colorless, with radiating and concentric sculpture; for other characters see diagnosis of family.

#### **Cocculina Rathbuni, n. s.**

Shell depressed, white, thin, with sides nearly parallel and their slopes lightly flattened, and with ends similarly broadly rounded; sculpture of faint closely (but irregularly) set grooves radiating from a smooth apex (which has originally a subspiral nucleus) and crossed by concentric growth lines, which are more or less irregular in different individuals; faint yellowish areas seem to indicate a thin, very closely adherent epidermis; apex prominent, more or less incurved and slightly laterally compressed, usually showing a scar where the embryonic nucleus was attached; inside polished or smooth; length 11.0; width 6.5; altitude $2.75^{mm}$. Another dead specimen is three times larger.

Soft parts: Foot ovate, thin, not very high, somewhat pointed behind; mantle margin moderately wide with a thickened plain border; behind, on each side of the "tail," between the mantle and foot, is one cylindrical blunt filament; sinus above the head and neck quite deep; gill exactly as in *Acmæa*, small, hardly projecting out of the sinus; head large, end of muzzle semi-lunate, with a strongly marked margin; in the midst of this flat lunate area is a rounded papillose space surrounding the mouth; this organ, if furnished with jaws at all, has them of such soft and cuticular consistency as to show neither under the knife nor under an ordinary dissecting microscope, but it appeared to be without jaws; tentacles moderate, subcylindrical; eyes none; course of the intestine much as in *Patella*, but shorter.

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* Much as in *Scutus* as figured by Gray, Guide, p. 163.

*Dentition.*—Rhachidian tooth squarish, rounded in front, nearly flat, about as long as the two inner laterals; inner three laterals slender, with small denticulate cusps, outer or third usually a little longer than the others, but the proportions slightly different in the less mature part of the radula; fourth or major lateral about twice as long as the others and slightly broader than the rhachidian tooth, rather strongly cusped, the cusp notched into five or six denticles, and the shaft somewhat curved, the shaft and cusp translucent; uncini numerous (100 or more), slender, slightly twisted and hooked, united on each side on a single continuous base, which is a little longer than the width of the radula between the uncini.

*Habitat.*—Station 937 of the United States Fish Commission in 1881. This is 102 miles S. by E. ½ E., by compass, from Gay Head Light, Martha's Vineyard. The bottom temperature being 40°.5 F., and that of the surface 72°.0 F. The same species was obtained by the United States Coast Survey dredgers on the steamer Blake, Lieutenant-Commander J. R. Bartlett, commanding, under the supervision of Prof. Alex. Agassiz, on hard bottom (temperature 44°.5 F.), at station 288, in 399 fathoms, off Barbadoes; and off Martinique, in 502½ fathoms sand and ooze, at station 195, bottom temperature 41°.0 F., the surface in both cases being about 80°.0 F. I take pleasure in naming this species after Mr. R. Rathbun, of the United States Fish Commission.

**Cocculina Beanii**, n. s.

Shell elevated, white, thin, resembling in sculpture and general features the last species, except in the following particulars: The form of the base is about as in *C. Rathbuni*, but the profile differs widely, the anterior and posterior slopes of the present species, instead of being subequal and nearly similar, are unequal, the anterior being considerably the longer, roundly and conspicuously arched; the posterior slope is about half as long as the other and deeply concavely excavated; this results from the fact that the apex, instead of being depressed and nearly central, is elevated, subposterior and much incurved; like that of the previous species it bears a scar where the (probably spiral) embryonic shell was attached; the sculpture resembles that of the preceding species, being stronger and more cancellated in some specimens and nearly obsolete in others. The very young show proportionally stronger sculpture, even slightly spinous at the intersections in some specimens. The surface is generally partly eroded, probably from the same action as that which so rapidly reduces dead shells and corals to a species of gray ooze in the deep sea. There seems to be no indication of epidermis in this species. Length 8.0; breadth 5.0; height 4.0$^{mm}$.

Soft parts in general as in the last species, except that the head and muzzle are much elongated, the sinus behind the head deep; gill longer and larger than in *C. Rathbuni*, projecting out on the right side of the head; tentacles longer and foot shorter proportionally than in *C. Rathbuni;* the mantle margin is much puckered, but this is probably due to the alcohol; the margination, which forms a semilunar area at the end of the muzzle in the preceding species, in *C. Beanii* is interrupted before the papillose area which here distinctly forms the end of the muzzle, the effect of which is to produce two lappets, one on each side, extending from the end of the muzzle to the anterior edge of the foot. There appears to be no jaw.

*Dentition.*—In this species the bands of uncini are proportionally longer and wider and the rhachidian tooth smaller than in the preceding. The rhachidian tooth is small, with a tridentate cusp and bifurcate base; it is about half as long as and hardly wider than the first three laterals; the latter are elongate, slender, with denticulate cusps, the outer is rather the shorter in the mature part of the radula; the major lateral is longer, with a more slender shaft than in *C. Rathbuni*, and a proportionally larger, very concave cusp with seven or eight denticulations; the banded uncini are singly broader than in *C. Rathbuni*, and collectively about one-half longer.

*Habitat.*—Station 871, U. S. Fish Commission, lat. 40° 02′ 54″ N., lon. 70° 23′ 40″ W., in 115 fathoms muddy sand; station 894, U. S. Fish Commission, lat. 39° 53′ N., lon. 70° 58′ 30″ W., 365 fathoms mud and gravel, both in 1880; station 947, 312 fathoms sandy mud, bottom temperature 44° F.; station 949, 79½ miles south of Martha's Vineyard, in 100 fathoms yellow mud, bottom temperature 52°.0, surface 66°.0 F.; station 997, 335 fathoms, yellow mud, bottom temperature 40° F.; these last in 1881 (Verrill); and from the same localities as *C. Rathbuni* in the West Indies (Agassiz), with the additional locality of station 264, 416 fathoms gray ooze, off Grenada, bottom temperature 42°.5 F.* It is named in honor of Dr. T. H. Bean, of the United States Fish Commission.

### Family ADDISONIIDÆ Dall.

Shell asymmetrical, porcellanous, somewhat like *Capulacmæa* Sars.

Soft parts much as in the last family, but strongly asymmetrical, with an enormously developed lateral series of separately inserted gill-laminæ, like those of *Patellidæ*, and without filamentary appendages of any kind. Radula with a large simple rhachidian tooth with, on each side, two large simple transverse laterals, followed by two minute ones, and a large outer lateral with a strong tridentate cusp, outside of which

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*This is, perhaps, the shell referred to under the name of "*Acmæa rubella*? Fabr." Verrill, Proc. U. S. Nat. Mus., III, p. 391, dredged (dead) at station 894, United States Fish Commission, 1880, off the S. E. coast of New England, in 39° 53′ N., 70° 58′ 30″ W., in 365 fathoms.

is a single scale-like flat uncinus, bearing an elongated thickened ridge, but no cusp.

Formula: $\frac{1}{1\ (\frac{1}{3} + 2 + 2{\cdot}2 + 2 + \frac{1}{3})\ 1}$.

This family might be incorporated with the last were it not for the differences in the branchiæ and in its dentition. These latter are of great weight. The dentition of *Addisonia* is like nothing known in the whole group of *Rhiphidoglossa*, but, while it recalls the dentition of the *Chitonidæ* in some features, has a decidedly Docoglossate aspect. Perhaps the most rational hypothesis is that this group bears to the preceding family much such a relation as in *Pulmonata* is borne by the *Cyclotacea* of Troschel toward the *Cyclostomacea*. Indeed, the resemblance of the radula of *Cocculina Rathbuni* to that of some of the species of *Helicina* figured by Troschel is quite remarkable. This family contains, so far as known, but one genus.

### Genus ADDISONIA[*] Dall.

Shell ovate, subconical, strongly asymmetrical, porcellanous, thin; with a blunt apex curved backward, downward, and to the left, without an epidermis; with an unthickened, simple, entire margin; pedal muscular impression horseshoe-shaped, interrupted in front. Soft parts: head provided with two tentacles without eyes or eye tubercles; muzzle plain, simple; foot thin, orbicular, without lateral or posterior tubercles, processes, or fringes; mantle edge simple, thickened; gill composed of leaflets as in *Patella*, the series starting on the right behind the head and continued within the mantle edge backward, the body of the animal being asymmetrically placed with regard to the aperture of the shell to afford room for the enormous series of branchial leaflets; anus opening behind and above the head slightly to the right of the median line, and indicated by a small papilla.

Radula: See description of the family.

Type and only species yet known.

**Addisonia paradoxa**, n. s.

Shell ovate, thin, whitish; apex presenting an appearance as if an embryonic tip (perhaps spiral) had fallen and been replaced by a peculiarly blunt ovate apex, which in the young shell is nearly marginal posterior and to the left of the middle line, but in the adult is considerably within the margin, curved downward and backward, and much more asymmetrical; sculpture of faint grooves radiating from the (smooth) apex and reticulated by the stronger concentric lines of growth, beside which the extremely inflated arch of the back is somewhat obscurely

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[*] In honor of Prof. Addison E. Verrill, of Yale College and the United States Fish Commission, whose surname has already been applied to more than one group of invertebrates.

concentrically waved; over the sculpture the shell has a polished appearance; margins thin, sharp; interior smooth, somewhat polished; the scar of the pedal muscle narrow, a considerable distance within the margin, the anterior ends of the scar enlarged, hooked backward on their inner edges; these ends connected by a line broadly arched forward and marking the attachment of the mantle to the shell over the head. Soft parts whitish, dotted with fine purple dots; mantle edge thickened, smooth; muscular base of the foot nearly orbicular, extremely thin and delicate, not high; muzzle short, plain, without any strongly defined margination, with the end finely papillose and a little puckered; mouth small, furnished with two lateral pads covered by a cartilaginous thin coat which completely dissolves in *liquor potassæ*, and hence can hardly be termed a jaw, though it occupies the place of the buccal plates in other genera; head moderate, not much produced, broader than long, extended laterally into a single rather short and stout tentacle on each side; tentacles showing slight transverse ridges (due to contraction?) destitute of any basal elbow or tubercle, such as bears the eye in allied groups, and with no appearance of any organ of vision or bulbus, whatever. Behind the head a thickened ridge, containing a large vessel, takes origin and passes backward around the right mantle edge, reaching nearly to the posterior median line; from this ridge depend fifty or sixty branchial leaflets resembling those of *Patella*, and not like those of *Acmæa* or the *Fissurellidæ;* these leaflets are very large in proportion to the size of the animal, and gradually diminish posteriorly; they are slightly inclined outward; the anal papilla is very inconspicuous, opening between the line of the branchia and the head, a little to the right of the head; the intestine is much shorter than in the *Patellidæ*, and coiled in much the same way through the very large greenish hepatic mass; this surrounds the ovary, which rises to the surface of the back in about its center, and in this individual was crowded with eggs already in various stages of segmentation and of about the size and general appearance of those of *Acmæa patina.* The ovary appeared to be a single simple sac-like body of irregular contour as in *Acmæa;* no crop was noticed and the stomach seemed of very moderate size.

Since but one specimen was available the observations were more or less imperfect, especially since the internal parts were somewhat softened. To obviate the extreme contraction caused by alcohol, the specimen was placed in water with the result that it almost immediately swelled and became covered with an immense quantity of very slimy mucus, which rendered it almost impossible to handle, being so slippery, and it had to be replaced in alcohol again to harden before the examination could proceed. The edge of the mantle is marginated with a rather broad thickened band, apparently without papillæ or other appendages of any kind. The space occupied by the branchiæ is so large that the remainder of the animal is forced a good deal to the left in the aperture of the shell.

The radula has a large flat, ovate central tooth with a thickened anterior edge but no marked cusp; on each side of this two rhomboidal flat laterals with a similarly thickened anterior margin, the inner is the larger and the outer somewhat more rounded in form; close to this are two minute narrow laterals with small cusps, hidden partly under the cusps of the next or major lateral, for which reason they cannot well be made out until the radula is partly torn apart or broken up; these two little laterals are the most anterior of the transverse series, which has a form like a very transverse M; the major lateral has strong Docoglossate features, being set on a flat plate whose posterior inner and anterior outer corners are thickened and raised into the likeness of a pseudocusp, the true shaft of the tooth being very short and terminating in a strong tridentate pellucid cusp; the outer tooth is a squarish, plate-like uncinus, exactly as in some chitons, with a thickened longitudinal ridge near the inner margin.

Length of shell about 10.0; width 7.5, and altitude 4.0$^{mm}$.

Dredged by the United States Fish Commission in 1881 at stations 923, 940, and 950 in 96, 130, and 69 fathoms, sandy bottom, about 75 miles S. and W. from Martha's Vineyard. Bottom temperature 52°, which belongs to the warmer bottom area. This very remarkable form would have been called a "synthetic type" by Prof. Louis Agassiz. The shell at once recalls *Capulacmæa* (= *Pilidium* Midd.), which, however, is distinctively Tænioglossate in dentition. The details of the branchial leaves resemble those in *Patella*, the position of the branchiæ and the form of the head resemble *Acmæa*, the smooth thick mantle margin and absence of eyes are characters found in *Lepetidæ*. Some features in the dentition recall *Chitonidæ*, and others *Cocculinidæ*. The position of the animal in its shell is as in the Rhiphidoglossa universally.

Nothing of the kind has been recognized in the collection made by Messrs. Sigsbee and Bartlett, of the U. S. Navy, in the Gulf of Mexico and Antilles, under the supervision of Prof. Alex. Agassiz, on the United States Coast Survey steamer Blake, leading to the supposition that this may be a rather more northern form, though found in the warm area.

## Order DOCOGLOSSA.

### Suborder ABRANCHIATA.

Animal destitute of external branchiæ. Embryonic shell spiral.

### Family LEPETIDÆ Gray.

*Lepetidæ* (Gray) Dall. Ann. Mag. of Nat. Hist. vii, pp. 286–291, April.

#### Subfamily LEPETINÆ.

Animal without eyes, without lateral teeth, with a rhachidian tooth, and erect uncini; muzzle with an entire margin, which is extended backward into a tentacle-like filament on each side; shell patelliform, with a subspiral nucleus, which is generally lost in early life, the permanent tip being erect or anteriorly directed. Typical genus *Lepeta* Gray.

### Subfamily LEPETELLINÆ n.

Shell and soft parts as in *Lepetidæ*, except that it has distinct eyes and is provided with true lateral teeth and also with scale-shaped uncini. Typical genus *Lepetella* Verrill.

### Genus LEPETELLA Verrill.

*Lepetella* Verrill, Am. Journ. Sci. xx, p. 396, Nov. 1880.

Type *Lepetella tubicola* Verrill l. c., also Proc. U. S. Nat. Mus. iii, p. 375, Jan. 1881.

*Habitat.*—In two to four hundred fathoms of the SE. coast of New England (stations 869 and 894, U. S. Fish Commission, 1880) in old tubes of *Hyalinœcia artifex* V. (Coast of Norway in deep water, Sars?)

Professor Verrill has well described this little shell in the articles referred to, as well as its dentition, which he calls Tænioglossate. It is indeed so in one sense, though not in the technical sense of belonging to the order *Tænioglossa*, which has a formula $\frac{1}{3\cdot3}$, while the formula of *Lepetella* is $\frac{1}{1\,(2\cdot2)\,1}$, the essential difference being that all *Tænioglossa* have on each side of the rhachidian tooth three laterals and no uncini, while *Lepetella* has two laterals and an uncinus.

The specimens examined by me were dry or from deterioration of the alcohol had become quite soft, and for this reason, perhaps, I could not detect the eyes seen by Professor Verrill so distinctly in the fresh and living animal.[*] So far as the external features could be determined there was no difference between them and those exhibited by *Lepeta* or *Cryptobranchia.* The dentition is remarkable, both in relative number of teeth and in presenting the only instance of a well-developed, distinct, scale-like (chitonoid) uncinus yet known in the order. In fact, the radula has throughout distinctly *Chiton-like* features, and bears additional testimony, if such were needed, to the acuteness of Troschel in combining (dental characters only being considered) both chitons and limpets in one dental order. The external form is, of course, partly due to its peculiar habitat; other specimens will, no doubt, eventually be found clinging to some flat surface and of normal shape. It seems to be a northern form, and does not occur in the Blake collections.

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[*] I have, however, no doubt of their existence. A letter from Dr. J. Gwyn Jeffreys states that a small limpet like *Lepeta*, but with eyes, has been dredged off the coast of Norway by Prof. G. O. Sars, which may probably prove to be *Lepetella.*

## Suborder PROTEOBRANCHIATA.

Animal with external branchiæ. Embryonic shell conical.

### Family ACMÆIDÆ.

Gill plumose, cervical.

### Genus SCUTELLINA Gray.

*Scutellina* Gray, P. Z. S. 1847, p. 168 = *Scutella* Broderip, not Lamarck. Type *S. crenulata* Broderip.

The animal of the typical species of *Scutellina* is unknown; according to Arthur Adams, that of a closely-allied species (*S. ferruginea*) resembles *Acmœa* in its externals, except that the shell is pure white, with prominently reticulated sculpture, and the apex is prominent, pointed, and very anteriorly situated. Mr. Adams distinctly states that the animal has eyes, and it is quite probable that the genus will eventually prove to be a good one.

A specimen was recently obtained, with the dried animal (from some West Indian corals), of a species which is also represented in the Blake collection, and which would probably be referred, from the shell characters alone, to *Scutellina*, though it differs from the received diagnosis of that genus in having a blunt, subcentral, erect apex, much like ordinary Acmæas. An examination of the soft parts showed, however, wide differences from any described genus, necessitating the establishment of a new one for its reception.

### Genus PECTINODONTA Dall.

Shell resembling *Scutellina*, with a blunt, subcentral apex. Soft parts resembling *Acmœa*, except in the following details: Animal blind, with the front part of the head between the tentacles and above the muzzle much produced upward and forward, extending considerably further forward than the end of the muzzle. Muzzle marginated, with lappets at the outer corners. Jaw thin, translucent. Gill exactly as in *Acmœa;* sides of foot and mantle-edge simple, nearly smooth. Dentition $\frac{0}{0\,(1\cdot1)\,0}$; teeth large, with transverse pectinated or denticulate cusps, like those of the large lateral teeth of some Tectibranchs or Nudibranchs.

**Pectinodonta arcuata** n. s.

Shell white, elongate-ovate, moderately elevated, with a blunt, polished apex, on which in young specimens remain traces of the disk-like, chalky, embryonic shell; the slopes from the apex to the ends both convexly arched, margin simple or slightly denticulated by the radiating sculpture; within polished; scars as in *Acmœa;* epidermis none; sculpture externally of fine, uniform, rounded, closely-set threads, radiating from near the apex to the margin, and reticulated by the fine, rather prominent, regular, concentric ridges of growth, both ridges and threads averaging near the margin about three and a half to the millimeter. Lon. from end to end, 14.5$^{mm}$; from apex to anterior end, 5.5$^{mm}$; lat. 10.0$^{mm}$; alt. 5.5$^{mm}$.

*Habitat.*—West Indies; St. Thomas, in coral; Santa Lucia, station 215, in 226 fathoms, Blake expedition.

The examination of a well-preserved specimen showed that the end of the muzzle formed a semilunar area with a distinctly-marked margin and lappets at the posterior corners. In the middle of this flat and nearly smooth area is the mouth, surrounded by a small circular papillose area. The jaw is thin and translucent, but sufficiently strong to resist contraction on the drying up of the soft parts. The radula contains about 175 series of teeth, which are large, with strong cusps, which are turned toward the middle line of the radula and strongly denticulate. The denticulate part, as in most *Docoglossa*, is nearly black, the anterior denticles are larger, the posterior nine subequal in size, the whole number of denticles is twelve; the whole tooth has somewhat the appearance of a coarse curry-comb, and suggests that it is due to a consolidation of the normal three Docoglossal laterals rather than the suppression of all but one and the modification of that one.

The protrusion of the anterior arch of the head is very peculiar and remarkable; the foot is rather short for the size of the shell; otherwise the features are those of *Acmæa*, in general. The gill is rather large and exactly as in *Acmæa*.

The number of teeth is the smallest known in any limpet, and none of the same shape have been recorded in the order. It is likely, however, that *Scutellina*, when investigated, will prove to have very similar dentition.*

## CHITONIDÆ.

### Genus CHÆTOPLEURA (Shuttleworth) Cpr.

### *Chætopleura apiculata* Say.

*Habitat.*—Station 938, United States Fish Commission, 1881, being 100 miles SE. by E. ½ E. (magnetic) from Gay Head Light, Martha's Vineyard. The depth was 210 fathoms, green sand and mud, the bottom temperature 40°.5, the surface 72°.0 F.

In these researches only two specimens of *Chitonidæ* were obtained, and these are not of a genus characteristic of the deeps. These specimen were young, but did not differ from young ones of the same species from shallow water. There have been found in depths of 100 fathoms or less along the northeastern coast of New England, and northward, two other tolerably common chitons, one of them *Trachydermon albus* Linné, which does not go to great depths, as far as known, either in the Atlantic or Pacific. In Alaska it is abundant from low-water to 100 fathoms. The other, *Leptochiton cancellatus* Sowerby, occurs off the British Possessions, and may reach a depth of 300 fathoms. Rarer species, which may be found in deep water, are *Leptochiton alveolus* Sars (150 fathoms Gulf of Maine); *Hanleyia mendicaria* Mighels and Adams; *H. debilis* Gray (to 300 fathoms); and *H. tropicalis* Dall, from southern waters (Sand Key, 128 fathoms).

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* I should be most thankful for a dried or alcoholic specimen of the soft parts of the typical species of *Scutellina* (*S. crenulata* Broderip).

The greatest depth from which chitons have been reported is 1,006 fathoms, at which the *Leptochiton Belknapi* Dall, was obtained in the North Pacific. It has since turned up from Kerguelen in the Challenger collections, and, perhaps, may eventually be found in the North Atlantic.

## NOTES ON THE GENERA.

The slender side teeth of *Lepeta* are distinguished from true laterals by not being situated on the central longitudinal area of the radula. By their form alone it would be impossible to distinguish them from teeth which are truly laterals, like the inner laterals of *Lepetella*.

Since 1869 (when I revised the classification of the *Lepetidæ* and, somewhat later, of the order to which they belong), little by little information has been coming in which fills the gaps then known to exist in our knowledge of the order. It is now possible to review more understandingly the relations of the dentition of the different groups. It would seem at first sight as if the dentition of *Lepeta* and *Lepetella* differed very widely, but more reflection diminishes the apparent divergencies.

It may be suggested that in *Lepeta cæca* the large rhachidian tooth really represents a consolidation of the six laterals characteristic of *Acmæa*, which is supported by the fact that G. O. Sars* figures the lateral cusps of the rhachidian tooth in *Pilidium fulvum* as accessory rather than inherent parts of that tooth, a view (I find on reference to them) supported in part by my own original drawings, and a condition which, though not universal nor necessary, may yet be characteristic of some stages of the development of the individual or of the radula; or perhaps of some individuals merely, while in others the consolidation goes so far that the sutures (as in the bony structures of higher animals) are obliterated. In that case the rhachidian tooth of *Lepetella* would represent the consolidation of the two inner laterals merely, if the number six be taken as typical, which, from its universality elsewhere in the order, we may reasonably assume to be the case. This is the typical number in the *Tænioglossa* to which (as Professor Verrill indicates in his description) the radula of *Lepetella* is in some respects analogous; though the *Tænioglossa* have no uncini. In the same way, as has before been pointed out, the single large dentate laterals of *Pectinodonta* may represent, in the other division of the order, each a consolidation of the three typical laterals of *Acmæa*.

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*Moll. Reg. Arct. Norveg. tab. II, fig. 12.

The name *Onychoglossa* has been used by G. O. Sars (1878) to denominate the same group and as indicative of the same characters as those possessed by the *Docoglossa* (Troschel, 1861), as revised by me eight years previously. I do not see any especial gain which might result to science from substituting the newer for the older name.

The relations of the groups may be expressed somewhat as follows:

## Order DOCOGLOSSA.

Shell wholly external, dish-shaped, with apex anteriorly directed; animal with two short tentacles, a non-extensible muzzle; branchiæ external or none; renal and anal apertures situated above the neck, between body and mantle edge; no copulatory or external genital organs; mouth provided with a horny jaw and long radula with peculiar teeth; dental formula not exceeding $\frac{1}{3\ (3\cdot3)\ 3}$; metamorphosis of the embryo taking place in the egg, which is fertilized in the ovary.

### Suborder ABRANCHIATA.

Animal without external branchiæ. Embryonic shell spiral.

#### Family LEPETIDÆ.

Subfamily *Lepetinæ*. Without eyes; with a marginated muzzle extended into (on each side) a tentacular process. Uncini erect. Dental formula $\frac{1}{2\ (0\cdot0)\ 2}\left(? = \frac{0}{2(3+3)2}\right)$.

$$\textit{Lepeta}\text{ Gray}\left\{\begin{array}{l}\textit{Lepeta}\text{ s. s. (+ }\textit{Pilidium}\text{ Forbes non Middendorf).}\\ \textit{Cryptobranchia}\text{ Middendorf.}\end{array}\right.$$

Subfamily *Lepetellinæ*. With eyes; other soft parts as in *Lepeta*. Uncinus scale-like. Dental formula $\frac{1}{1\ (2\cdot2)\ 1}\left(? = \frac{0}{1\ (3+3)\ 1}\right)$.

*Lepetella* Verrill.

### Suborder PROTEOBRANCHIATA.

Animal with external branchiæ. Embryonic shell conical.

#### Family ACMÆIDÆ.

With a plumose cervical branchia; with or without a branchial cordon; muzzle frilled; no rhachidian tooth.

#### A. Without a cordon.

#### *A.* Muzzle with lappets.

#### *a.* Blind.

*Pectinodonta* Dall. $\frac{0}{0\ (1\cdot1)\ 0}\left(? = \frac{0}{0\ (3\cdot3)\ 0}\right).$

#### *b.* With eyes.

*Scutellina* Gray. Typical species not yet examined.

*Acmæa* Esch. $\frac{0}{0\ (3\cdot3)\ 0}.$

#### *B.* Without muzzle lappets.

*Collisella* { *Collisella* Dall, s. s. $\frac{0}{1\ (2\text{–}1\cdot1\text{–}2)\ 1}.$
*Collisellina* Dall. $\frac{0}{2\ (2\text{–}1\cdot1\text{–}2)\ 2}.$

#### B. With an interrupted cordon; no lappets.

*Lottia* (Gray) Cpr. $\frac{0}{1\ (2\text{–}1\cdot1\text{–}2)\ 1}.$

#### C. With complete cordon; no lappets.

*Scurria* Gray (not Cpr.). $\frac{0}{1\ (2\text{–}1\cdot1\text{–}2)\ 1}.$

### Family PATELLIDÆ.

Without a cervical branchia, but with a more or less complete cordon; muzzle papillose, not frilled, marginated, or with lappets.

#### A. Branchial cordon complete.

*a.* With rhachidian tooth; branchial lamellæ arborescent, produced; sides of foot smooth. *Ancistromesus.*

*Ancistromesus* Dall. $\frac{1}{3\ (1\text{–}2\cdot2\text{–}1)\ 3}.$

*b.* Without rhachidian tooth; branchial lamellæ short, linguiform. *Patella.*

*Patella* Linné. Foot smooth, branchial lamellæ subequal all around.
$\frac{0}{3\ (1\text{–}2\cdot2\text{–}1)\ 3}.$

*Patinella* Dall. Foot with a scalloped frill interrupted only in front; gills as in *Patella*. $\frac{0}{3\ (2-1\cdot1-2)\ 3}$.

*Nacella* Schumacher. Foot frilled; gills very small in front; shell peculiar; lateral teeth all bidentate. $\frac{0}{3\ (2-1\cdot1-2)\ 3}$.

B. Branchial cordon interrupted in front.

*a.* Sides of foot smooth. ***Helcion.***

***Helcion*** Montfort. Third laterals posterior, bidentate. $\frac{0}{3\ (1-2\cdot2-1)\ 3}$.

***Helcioniscus*** Dall. First laterals anterior. $\frac{0}{3\ (2-1\cdot1-2)\ 3}$.

*Patina* Gray. Third laterals posterior, denticulate; shell peculiar. $\frac{0}{3\ (1-2\cdot2-1)\ 3}$.

* * * * * * *

*Metoptoma* Phillips. Posterior edge emarginate or waved. Fossil in Carboniferous of Great Britain.

JANUARY 22, 1882.

## ON TWO RECENT ADDITIONS TO THE NORTH AMERICAN BIRD-FAUNA, BY L. BELDING.

### By ROBERT RIDGWAY.

1. **Motacilla ocularis**, Swinhoe. (Ibis, 1860, p. 55).

This species, which is the common East-Asiatic species, has been taken at La Paz, Lower California, by Mr. Belding, who secured a single adult specimen in winter plumage, on the 9th of January, 1882. It was undoubtedly a straggler, but it seems incredible that it could have found its way there across the broad expanse of the Pacific Ocean. On the other hand, it is difficult to conceive by what other means it could have reached a locality so far from its natural habitat, not being known from any part of the Pacific coast of North America, even in Alaska, although specimens have been obtained at Plover Bay, Siberia. In eastern Asia it occurs in winter as far south as Amoy, where it was first discovered by Mr. Swinhoe.

This species much resembles *M. alba* of Europe, having like it a gray back, but differing in having a large white patch covering both rows of wing-coverts, and in having a distinct post-ocular streak of black, running into the black of the occiput.

2. **Dendrœca vieilloti bryanti**, Ridgway.

(*Dendroica vieilloti* var. *bryanti* RIDGW. Am. Nat., vii, 1873, p. 606; B. B. & R., Hist. N. Am. B., i, 1874, p. 218.—*Dendrœca vieilloti* SALVIN & GODMAN, Biol Centr.-Am. Aves, i, 1879, 125, part.)

This species, described originally from Yucatan, Honduras, and Mazatlan, was found to be quite common at La Paz, in January, 1882, by

Mr. Belding. He sends two specimens, an adult male and female, which agree closely with Mazatlan examples. These western specimens all differ appreciably from eastern ones (from Yucatan and Honduras) in the darker shade of chestnut on the head and in some other less important characters, but until I have seen more specimens I do not venture to separate them.

The group to which this species belongs is an exceedingly difficult one on account of the great amount of variation with locality. A recent examination of a large series of specimens from various localities strongly suggests the probability of the existence in Middle America and the West Indies of but a single species of "Golden Warbler" besides *D. æstiva*, but this broken up into numerous local races more or less distinct from one another. According to this view, *D. petechia*, *D. capitalis*, and other West Indian races, *D. aureola*, of the Galapagos, *D. vieilloti*, and the present bird would all represent merely local variations of a single species, the difference being appreciable chiefly, if not only, in fully adult males, and consisting in the varying amount of rufous on the head and under parts. So far as the material in the National Museum collection is concerned, the distinctions between the present bird and the true *D. vieilloti*, pointed out in the descriptions above cited, hold good, and I must therefore, for the present at least, beg to dissent from the opinion of Messrs. Salvin and Godman (in Biol. Centr.-Am. Aves, i, p. 125) that *D. bryanti* cannot be separated from *D. vieilloti.*

SMITHSONIAN INSTITUTION, *March* 10, 1882.

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## THE TAXONOMONIC RELATIONS AND GEOGRAPHICAL DISTRIBUTION OF THE MEMBERS OF THE SWORD-FISH FAMILY, XIPHIIDÆ.

### By G. BROWN GOODE.

The following essay toward a reformulation of the characters by which the members of the sword-fish family are classified is the outcome of a systematic study of this group of fishes, a detailed statement of which, together with an account of the sword-fisheries of the world, are given in full in a forthcoming report of the United States Fish Commission. The views of the writer having been somewhat modified since reading the proof-sheets of the report just referred to, the portion relating to the classification of the group has been rearranged and is here presented. The views of Dr. Lütken, of the Zoological Museum, Copenhagen, as expressed in his recent work entitled "Spolia Atlantica", have received a careful consideration in the preparation of these notes, and have, to a considerable extent, been adopted.

As Dr. Lütken has pointed out, the genus *Xiphias*, to which the common sword-fish belongs, cannot, as has hitherto been customary, be regarded as the central type of the family, but must be considered an aberrant or divergent type; the round-billed species, provided with ventral fins, especially those of the genus *Histiophorus*, being the most typical and representative of the group.*

Representatives of all the genera of the sword-fish family occurring in the waters of the United States the writer has had opportunities of studying and formulating by means comparison, certain structural characters never before expressed.

## DESCRIPTION OF THE FAMILY XIPHIIDÆ.

### Family XIPHIIDÆ, Agassiz.

*Xiphioides*, AGASSIZ, Recherches sur les Poissons Fossiles, v, 1843, p. 89.—BLEEKER, Enum. Sp. Pisc. 1859, p. 62.

*Xiphiidæ*, GÜNTHER, Catalogue of the Fishes in the British Museum, ii, 1860, p. 511; Fische des Südsee, i, 1873–5, p. 105; Study of Fishes, 1880, p. 431.—GILL, Arrangement of the Families of Fishes, 1872, p. 8 (name only).—DAY, Fishes of India, i, 1876, p. 198.

### *Diagnosis of family.*

Scombroid fishes, with elongate, compressed bodies, covered with elongate scale-like scutes (*Tetrapturinæ*) or naked (*Xiphiinæ*). Premaxillaries with nasal and vomerine bones produced in a long spear-like snout, immovably articulated with the prenasal and maxillary. Teeth rudimentary (*Tetrapturinæ*) or absent (*Xiphiinæ*). Nasal bone cellular at its base. Ventrals rudimentary (*Tetrapturinæ*), or absent (*Xiphiinæ*). A single dorsal, extending nearly the whole length of the body in young, persistent (*Histiophorus*) or subpersistent, divided in middle with age (*Tetrapturus*), or becoming with age subdivided into two short dorsals (*Xiphiinæ*). A similar rudimentation of anal fin in both subfamilies. Preopercular spine present in young (*Xiphiinæ*), or parietal and preopercular spines (*Tetrapturinæ*), disappearing with age. Seven branchiostegals. Pseudo-branchiæ present. Branchiæ cancellated or reticulated. Air-bladder present, cellulated (*Tetrapturus* and *Histiophorus* (?)), or simple (*Xiphiinæ*). Intestine short, not sinuous (*Tetrapturinæ*), or long, sinuous (*Xiphiinæ*). Gall-bladder free, hanging at some distance from the liver. Articular processes developed from the parapophyses.

### *Synopsis of subfamilies.*

Ventrals present: skin with scutes: snout rounded: caudal keels double. TETRAPTURINÆ, Gill.

Ventrals absent: skin scaleless: snout flat: caudal keel single..XIPHIINÆ, Swainson.

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* 1875, LÜTKEN, CHR.

Om rundnæbides Svaerdfiske, saerligt om *Histiophorus orientalis*, Schl. < Vidensk. Meddel. Naturhist. Foren. Kjöbenhavn, 1875, pp. 1–21 + 1–5.

## DESCRIPTIONS OF THE SUBFAMILY TETRAPTURINÆ AND THE GENERA TETRAPTURUS AND HISTIOPHORUS.

### Subfamily TETRAPTURINÆ, Gill.

*Tetrapturinæ*, Gill, in Rep. U. S. F. C. i, 1873, p. 787; Cat. Fish. E Coast N. A. 1873, p. 9 (name only; no description).

### *Diagnosis of subfamily.*

Xiphiid fishes, with bodies much compressed, covered with elongate, scale-like scutes. Sword somewhat flattened, but rounded at edges, spear-like. Tooth-like granulations upon the jaws. Pelvic arch present. Ventrals reduced to a single ray. Dorsal fin single (*Histiophorus*) or in two portions, but little remote, separated by aborted section (*Tetrapturus*). Preopercular spine absent (but probably present in young). Two keels upon each side of caudal peduncle. Ultimate dorsal and anal rays suctorial. Air-bladder very large, sacculated, consisting of numerous separate divisions. Intestine short, straight. Two genera, *Histiophorus* and *Tetrapturus*.

### *Synopsis of genera.*

Dorsal fin single, high, sail-like: ventral rays two or three.... *Histiophorus*, Lacépède.
Dorsal fin double, *Xiphias*-like: ventral rays one ............ *Tetrapturus*, Rafinesque.

### Genus *Tetrapturus* Rafinesque.

*Tetrapturus*, RAFINESQUE, Caratteri, etc., 1810, p. 54, pl. 1, fig. 1.
*Tetrapterus*, AGASSIZ, Poiss. Foss. v, 1843.

### *Diagnosis of genus.*

Xiphiid, tetrapturine fishes, with body much compressed. Two dorsal and two anal fins in adult state; single dorsal and anal in immature ages. Tooth-like asperities on palatines and lower jaw. Body covered with cultriform scale-like scutes, under epidermis. Dorsal rays much more numerous than in *Xiphias*, less so than in *Histiophorus*. Ventrals rudimentary, consisting of one pair of very elongate, flattened rays. Vertebræ 25 (*T. belone*). Pyloric cæca very numerous. Intestine short, nearly straight.

*Habitat.*—Mediterranean, tropical and subtropical Atlantic.

1. **Tetrapturus imperator** (Schneider), Goode.

*Xiphias imperator*, SCHNEIDER, Bloch's Syst. Ichth. 1801, p. 93, pl. xxi (poor figure), founded on Duhamel, iii, p. 333, pl. xxvi, fig. 2.

*Tetrapturus belone*, RAFINESQUE, Caratteri Animali e pianti della Sicilia, 1810, p. 54, pl. i, fig. 1.—CUVIER, Règne Animal, 2d ed. 1829, ii, p. 201.—CUVIER & VALENCIENNES, Hist. Nat. Poiss. viii, 1831, p. 280, pls. ccxxvii (skeleton), ccxxviii (adult fish).—BONAPARTE, Catologo Metodico, 1846, p. 80.

*Tetrapterus belone*, AGASSIZ, Poissons Fossiles, 1843, v, p. 89, tab. E. (fine figure of skeleton).

*Tetrapterurus belone*, BONAPARTE.

*Histiophorus belone*, GÜNTHER, Cat. Fish Brit. Mus. ii, 1860, p. 513.

*Skeponopodus typus*, NARDO, Isis, 1833, Heft iv, p. 417 (Adriatic).

This species appears to be limited to the waters of the Mediterranean. It was not noticed by Linnæus, or indeed by any of the binomial writers before Schneider. In his posthumous edition of the writings of Bloch, the latter has made reference to a figure and description in Duhamel, and has given to a fish, which he figures in plate xxi of this work, the name *Xiphias imperator*. This name was rejected by Cuvier (Règne Animal, l. c.), and has not been recognized by later writers. It seems to me, however, that Schneider has, perhaps unintentionally, yet quite intelligibly, expressed the principal differential characters of *Tetrapturus*. By "dorso scabro" he covers the question of the scales; by "carina caudali nulla" he refers to the absence of the single caudal carina of *Xiphias*, while by figure and by implication in his description he admits the presence of ventral fins. His figure, though bad, is as good as most of the old figures of *Xiphias*—that of Lacépède for example.

*T. imperator* is said to attain the length of five or six feet, and the weight of 150 pounds. It has been taken in the Straits of Messina with the harpoon, but according to Rafinesque is very rarely seen on the coasts of Sicily, and then only in autumn, when it is following the dolphin and flying-fish, upon which it feeds. It is ordinarily seen in pairs, male and female together, and they are taken often in the nets together. Its flesh is white but not particularly well flavored. At Messina it is called "*Aguglia imperiale*" (Cuvier & Valenciennes, l. c.).

2. **Tetrapturus indicus**, Cuvier & Valenciennes.

*Tetrapturus indicus*, CUV. & VAL. Hist. Nat. Poiss. viii, 1831, p. 286 (on figure belonging to Sir Joseph Banks).

A species founded on a figure of a specimen obtained in Sumatra communicated by Sir Joseph Banks to Broussonet, who refers to it at the end of his "Memoire sur le Volier".*

The description is worthless. It is stated by Cuvier and Valenciennes that this fish had been supposed to be the male of *Histiophorus gladius*, but that it is much more nearly related to *Tetrapturus* of the Mediterranean, though with a longer beak.

The notes accompanying the figure state that it attains the length of nine feet and the weight of 200 pounds, and was known to the Malays by the name "*Joo-hoo*".

Günther regards it as perhaps synonymous with *T. Herschelii*, Gray.†

3. **Tetrapturus Herschelii**, Gray.

*Tetrapturus Herschelii*, GRAY, Ann. Nat. Hist. i, 1838, p. 313, pl. x.—LÜTKEN, ll. c.
*Histiophorus Herschelii*, GÜNTHER, l. c.

This species was described from a specimen eleven feet long obtained at Table Bay, Cape of Good Hope, in 1837. The description is reproduced in the appendix, and the plate is also here presented. The type of *T. Herschelii* is in the British Museum. The United States National Museum has some fine skins, apparently of this species, brought from Mauritius by Col. Nicholas Pike, United States consul. There is no reason to doubt that this species may be the same with *T. indicus*, Cuv. & Val., just described, there being little probability that there are two species in waters so close as those of Sumatra and the Cape of Good Hope.

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* Hist. de l'Acad. des Sciences, Paris, 1786, pp. 450–455.

† Günther, l. c. p. 513, sub. *Histiophorus Herschelii*.

4. **Tetrapturus Georgii**, Lowe.

*Tetrapturus Georgii*, LOWE, Proc. Zool. Soc. viii, 1840, p. 36: Trans. Zool. Soc. iii, 1849, p. 3 (reprint of first).—GÜNTHER, op. cit. p. 512, foot-note.—LÜTKEN, ll. c.

This species known at Madeira as "*Peito*", was described by Lowe thus briefly: "I am enabled to state that it forms a new and very distinct species of *Tetrapturus*, Raf., differing from *T. belone* Raf., as described by MM. Cuvier and Valenciennes, especially in having the pectoral fins proportionately twice as long, and the body clothed with large scales of a peculiar shape and character."

Lütken believes it to be identical with the two species of the Indian Ocean just discussed, as well as with the two Cubian species. It should surely be carefully compared with the latter.

5. **Tetrapturus albidus**, Poey.

*Tetrapturus albidus*, POEY, Mem. Hist. Nat. Cuba, ii, 1858, p. 237, pl. xv, fig. 1; pl. xvi, figs. 2–13; pl. xvii, figs. 1, 5, 6–9, 10–11, 26: Ib. p. 258: Rep. Fis. Nat. Cuba, ii, 1868, p. 380.—GILL, Cat. Fish E. Coast N. A. 1873, p. 24.—LÜTKEN, ll. c.

6. **Tetrapturus amplus**, Poey.

*Tetrapturus amplus*, POEY, op. cit. p. 243, pl. xv, fig. 2; pl. xvi, figs. 12–25; Rep. Fis. Nat. Cuba, ii, 1868, p. 380.—LÜTKEN, ll. c.

These two species are described by Poey from Cuba, and one of them, *T. albidus*, is not uncommon on the Atlantic coast of the United States. Lütken is disposed to consider them both identical with the *T. indicus* type, and it seems to me that there is as much reason for this procedure as for merging the Sail-fishes of the Atlantic and Indian Oceans, as has been persistently done by all writers on ichthyology.

7. **Tetrapturus brevirostris** (Günther & Playfair), Lütken.

"*Histiophorus brevirostus*, GÜNTHER & PLAYFAIR, Fishes of Zanzibar, 1866, pp. 53, 145, figure."—DAY, Fishes of India, 1876, p. 199, pl. xvii, fig. 3.
*Tetrapturus brevirostris*, LÜTKEN, ll. c.
*Histiophorus*, KNOX, Trans. New Zealand Institute, ii, 1870, pp. 13–16, fig. 1.

This species, the habitat of which is given by Day as "? East coast of Africa, seas of India, perhaps New Zealand", is referred by Lütken to the same species with *T. indicus* and *T. Herschelii*. Day considers it closely allied to *Tetrapturus Lessonii*, Canestrini.

8. **Tetrapturus Lessónii**, Canestrini.

*Tetrapterus Lessonii*, CANESTRINI, Arch. Zool. 1861, i, p. 259, pl. vii.—LÜTKEN, ll. c.—DAY, ll. c.

This species, described by Canestrini from the Mediterranean, is referred by Lütken to the general cosmopolitan type, of which *T. indicus* and *T. Herschelii* are the representatives.

## DESCRIPTIVE NOTES ON THE AMERICAN SPEAR-FISH, TETRAPTURUS ALBIDUS.

The following description was drawn up from a fine specimen of the spear-fish taken at Block Island, R. I., in 1875:

A male fish of 2,150$^{mm}$ (84.646 inches), ordinary size.

Body elongated, nape elevated, bringing the greatest height over the operculum (10.27 inches). At the point of the pectoral the height is nine-elevenths of that at the operculum (8.4 inches), and is contained about 10 times in total length.

The head from extremity of lower jaw is contained in the total length 4 times (21.161 inches). The eye is situated midway between operculum margin and tip of lower jaw. The length of the bill beyond lower jaw equals greatest height of head. Palatines with a narrow band of rough denticulations. Asperities on the lower jaw. Bill extremely hard, especially at its extremity; its form is depressed, its edges rounded, its height greater than half its width. Preoperculum situated far back; commences midway between the eye and the opercular margin. The other opercular bones are not visible in fresh specimen.

Lateral line marked by a series of minute apertures on a continuous band, connected at the top of operculum; continues backward in a straight line for a short distance, then bends downward and reaches the middle line of the body at the point of the pectoral. Scales bony, linear, absent from the head, except on the cheeks. Those of lateral line not pierced. All the scales covered by epidermis.

Br. 7; D. 3, 39–6; A. 2, 13–6; P. 19; V. 1, 4; C. 12.

All the rays osseous, not articulated; those indicated as osseous are only distinguished from the others by their terminating in a point, which is not free. The others are flattened towards the extremity and frayed at the ends. The two first anal and three first dorsal rays are ossified to each other and upon the ray behind them, so that they appear to sight and touch as if only a single ray. Dissection shows that the first dorsal is very small (20$^{mm}$); second, 2½ times as high (50$^{mm}$); third, 115$^{mm}$; the fourth twice as long. The same in anal. First, 30$^{mm}$; second, 70$^{mm}$; third like fourth dorsal in form. These fins are for the most part hidden in the furrows, and their last rays are extremely short, so that it is necessary to lay them bare by dissection.

First ray of second dorsal and second anal flat and striated; these fins are crenated. The fourth of first dorsal and third of first anal touch the summits of the fins, which are slightly rounded.

First ray of pectoral very strong and prolonged to the extremity; 8 last short, forming the subbrachial dilation.

Ventral appears at first sight a single ray, but dissection shows 5, the 3 first anchylosed. They are received in a furrow, which extends to the anus.

Caudal stiff; bifurcation making angle of 72° from middle of the two caudal crests to the point of the lobes, and, neglecting points, 80°.

Origin of first dorsal above preopercle, its height surpassing by one-sixth the height of the body beneath it.

Pectoral one-eighth length of body from point of lower jaw.

First anal lower than dorsal.

The two others are small and opposite. The second dorsal a little farther back, a little higher, and a little more "échaucrée".

*Color.*—Pronounced deep blue above, a little lighter on the flanks, passing into white below. Fins intense blue; second anal and outside of pectoral lighter. First dorsal with rounded spots, more intense, of same color. Iris clear blue; cornea blackish.

Four gills of double structure and an accessory, reticulated as in *Xiphias.*

Pylorus attached high up and has great longitudinal folds; also the duodenum, which is swollen and receives, by two openings, the secretions of the compact and glandulous mass which covers it.

Intestine slender, with two short convolutions, embracing in its last the spleen.

Swim-bladder cellulous, showing great puffs, which extend far behind the anus.

A second specimen, the measurements of which are given below (B), suggested the following notes:

Top of head and body, upper lobe of caudal fin, and caudal cartilage bluish black. Belly and throat white. Cheeks and opercular blackish, covered with a pearly sheen. The black hue of the back shades into the white of the belly through an insensible gradation of lines, the most prominent of which are rich purplish brown and light smoky gray. The belly and the sides are pearly up to the lateral line. The boundary between the colors of the back and the belly is indicated by an indistinct line, which may be traced from the base of the rostrum over the top of the orbit and the operculum, then descending across the lateral line at a point above the middle of the pectoral fin; it then rises in the arc of a circle above the lateral line, which it meets again at the tail, the distance between them being the greatest over the anal fin. The lower lobe of the caudal is blackish, with a pearly sheen. The ventrals and second dorsal fins are blue-black. The anterior rays of the first dorsal are also blue-black, the membrane being light bluish purple, irregularly spotted with circular dots from one-quarter to one-half an inch in diameter. The first anal is deep bluish purple at its extremity, but on its basal half bright pearly white. The inner surface of the pectoral is bluish purple, brightest in the axil; its outer surface is blackish, though completely covered with a pearly sheen.

The ventrals, first dorsal, and first anal, when not erected, are completely hidden in grooves. The second dorsal and second anal are not so hidden. The pectorals are flat, closely clinging to the sides when not in motion; their base received into a depression in the side of the fish.

The lanceolate scales may be seen through the epidermis, giving a reticulated appearance to sides of the fish.

The second dorsal and the second anal have broad, flattened, ultimate rays, which adhere closely to the body of the fish.

*Measurements.*

| Current number of specimen | A. | B. |
|---|---|---|
| Locality | New Bedford, Mass., July, 25, 1875. | Wood's Holl, Mass., 1875. |
| | Inches. | Inches. |
| Extreme length | 80.00 | 89.00* |
| Length to end of middle caudal rays | 70.50 | 81.00 |
| Body: | | |
| Greatest height | 9.00 | 11.50†<br>9.00‡ |
| Height at ventrals | 9.00 | |
| Head: | | |
| Greatest length | 27.00 | 28.75 |
| Greatest width | 5.00 | |
| Width of interorbital area | 4.25 | |
| Length of snout | 17.50 | 19.50 |
| Length of bill | | 12.25§ |
| Length of operculum | 3.00 | |
| Length of upper jaw to commissure of jaws | | 22.75 |
| Length of lower jaw to commissure of jaws | | 10.50 |
| Distance from snout to orbit | 17.50 | |
| Diameter of orbit | 2.00 | 2.00 |
| Dorsal: | | |
| Distance from snout | 26.00 | 28.00 |
| Length of base | 40.00 | 37.00 |
| Greatest height | | 12.25 |
| Height at first spine | 11.50 | |
| Height at second spine | 11.75 | |
| Height at third spine | 11.00 | |
| Height at fourth spine | 10.75 | |
| Height at fifth spine | 10.50 | |
| Height at sixth spine | 9.00 | |
| Height at seventh spine | 7.25 | |
| Height at eighth spine | 5.00 | |
| Height at ninth spine | 5.75 | |
| Height at tenth spine | 4.50 | |
| Height at eleventh spine | 3.50 | |
| Height at twelfth spine | 3.50 | |
| Height at thirteenth spine | 3.00 | |
| Height at fourteenth spine | 2.50 | |
| Anal: | | |
| Distance from snout | 49.00 | 54.00 |
| Length of base | 15.00 | 10.25‖ |
| Height at first spine | 7.50 | |
| Height at second spine | 7.50 | |
| Height at third spine | 6.75 | |
| Height at fourth spine | 6.00 | |
| Height at fifth spine | 5.50 | |
| Height at sixth spine | 2.75 | |
| Height at seventh spine | .80 | |
| Height at eighth spine | .50 | |
| Height at ninth spine | .35 | |
| Height at tenth spine | .25 | |
| Height at eleventh spine | .10 | |
| Height of fin above sheath | | 7.25 |

* To vertical from upper caudal lobe.

† At origin of dorsal.

‡ Over vent.

§ Beyond tip of lower jaw.

‖ "Length of anal groove."

*Measurements*—Continued.

| Current number of specimen | A. | B. |
|---|---|---|
| Locality | New Bedford, Mass., July 25, 1875. | Wood's Holl, Mass., 1875. |
|  | Inches. | Inches. |
| **Caudal:** |  |  |
| Length of middle rays | 2.00 | ............ |
| Length of external rays | 16.00 | ............ |
| Distance between lobe tips | ............ | 24.25 |
| **Pectoral:** |  |  |
| Distance from snout | 28.50 | 29.00 |
| Length | 14.75 | 13.50 |
| **Ventral:** |  |  |
| Distance from snout | ............ | 30.50 |
| Length of groove from base of ventrals to vent | 10.00 | 18.50 |
| **Dorsal** | 40+6 | 39+5 |
| **Anal** | 11+6 | 14+6 |
| **Caudal** | 6+4+4+5 | ............ |
| **Pectoral** | 18 | 20 |
| **Ventral** | 1 | 1 |
| **Weight, dressed (pounds)** | 55¼ | ............ |
| **Number of vertebræ:** |  |  |
| Dorsal | 11 | ............ |
| Caudo-lumbar | 13 | ............ |

## Genus *Histiophorus* Lacépède.

<*Istiophorus*, LACÉPÈDE, Hist. Nat. Poiss. iii, 1803, p. 374.
<*Histiophorus*, CUVIER & VALENCIENNES, Hist. Nat. Poiss. viii, 1833, 291.
<*Histiophorus*, GÜNTHER, Cat. Fish. Brit. Mus. ii, 1860, p. 512.
*Notistium*, HERMANN, Observ. Zool. 1804, p. 305.

### *Diagnosis of genus.*

Xiphiid, tetrapturine fishes, with body slender and very much compressed. Dorsal single (though the last few rays are nearly abortive), retaining the character of extreme youth, which is lost in *Xiphias* and *Tetrapturus*, and very lofty. Vertebræ 24 (*H. indicus*). Anal fin double. Numerous tooth-like asperities on the jaws. Body covered with elongate scales. Dorsal rays, being unaborted, very numerous. Ventrals consisting each of two or three elongate rays. Intestine short, nearly straight, with two foldings. A single species in the United States, *Histiophorus americanus*, Cuvier.

9. **Histiophorus gladius** (Broussonet), Lacépède.

*Scomber gladius*, BROUSSONET, Mem. Acad. Sci. 1786, p. 454, pl. x.
<*Scomber gladius*, BLOCH, Ichthyology, pl. cccxlv: Hist. Nat. Poiss.
<*Istiophorus gladius*, LACÉPÈDE, "iii, pp. 374-5", 2d ed. 8°, 1819, p. 542.
*Histiophorus gladius*, GÜNTHER, l. c. p. 513.—GILL, ll. c.
<*Xiphias velifer*, SCHNEIDER, l. c. p. 93.
*Histiophorus indicus*, CUV. & VAL. l. c. p. 293, pl. ccxxix.

This species, described first by Broussonet from specimens brought from the Indies—"la mer des Indes"—by Banks, has usually been considered, perhaps rightly, by later authors to be identical with the American form.

10. **Histiophorus americanus**, Cuvier & Valenciennes.

*Guebucu brasiliensibus*, MARCGRAVE, Hist. Brasil. 1648.
<*Scomber gladius*, BLOCH, l. c.
<*Histiophorus gladius*, authors.—
*Histiophorus americanus*, CUV. & VAL. l. c. p. 303.
*Skeponopodus guebucu*, NARDO, Isis, Heft iv, p. 416.

The history of this species is given below. Lütken follows the general lead in identifying this with *H. gladius*.

11. **Histiophorus orientalis**, Temminck & Schlegel.

*Histiophorus orientalis*, TEMM. & SCHLEG. Fauna Japonca, Pisces, 1842, p. 103, pl. lv (specimen 7 feet long, from Japan).—GÜNTHER, op. cit. p. 514.—LÜTKEN, Vid. Med. Nat. Foren. 1875, p. 1, pl. i (specimen 7 feet 1¼ inches long, from Singapore).

In his first paper on the Sword-fishes Lütken, though doubtful, seemed inclined to consider this a distinct species. In "Spolia Atlantica" he speaks of two species of *Histiophorus*, but I am unable to decide whether it is this or *H. gracilirostris* which he regards as well separated from *H. gladius*. Speaking of the occurrence of this fish in the seas of Japan, Temminck and Schlegel remark that its Japanese name is "Herivo"; that it is occasionally taken in autumn on the southwest coast of Japan during the progress of the tunny fishery, and that its flesh is much esteemed.

12. **Histiophorus immaculatus**, Rüppell.

*Histiophorus immaculatus*, RÜPPELL, Proc. Zool. Soc. iii, 1835, p. 187 (abstract): Trans. Zool. Soc. ii, p. 71, pl. xv: "N. W. Fische, p. 47, taf. xi, fig. 3".—GÜNTHER, l. c.—LÜTKEN, ll. c.—DAY, Fish. India, 1876, p. 199.

Rüppell's specimen came from Djetta on the Red Sea, where the Arabs caught it in a net. He regards it as rare because the Arabs had no common name for it. The specimen is preserved in the museum at Frankfort, and, if I rightly understand Dr. Lütken, is 18 inches long. Dr. Lütken unhesitatingly pronounces it the young of *H. gladius* or *H. orientalis*, considering it to be slightly older than the one figured by Cuvier and Valenciennes as *H. pulchellus*.

Day mentions a specimen of this species in the Madras Museum 5 feet 9 inches long. This, to be consistent with Lütken's theory, must be regarded as a specimen in which the colors have disappeared.

13. **Histiophorus pulchellus**, Cuvier & Valenciennes.

*Histiophorus pulchellus*, CUV. & VAL. Hist. Nat. Poiss. viii, 1831, p. 305, pl. ccxx.—GÜNTHER, op. cit. p. 514.—LÜTKEN, ll. c.

Cuvier and Valenciennes described under this name a specimen 4 inches long taken in the Eastern Atlantic, north of the Cape of Good Hope, probably somewhere on the west coast of Africa, by M. Raynaud. There were said to have been a great many more of the same size in the place where it was taken.

Lütken regards it as the young of *Histiophorus gladius*. He uses it to complete the series of development between the small specimens described by Günther and the adult forms.

14. **Histiophorus gracilirostris**, Cuv. & Val.

*Histiophorus gracilirostris*, CUV. & VAL. l. c. p. 308 (description of a snout from Seychelles).—LÜTKEN, ll. c.

Cuvier and Valenciennes had in their possession, and described, a beak or spear the breadth of which was contained 25 to 26 times in its length, and the sides of which were more rounded than in the other specimens accessible to them. This was from Seychelles. Lütken is inclined to admit this provisionally as a distinct species. Günther, on the other hand, ignores *H. gracilirostris*, but regards *H. ancipitirostris* as a possibly existing form.

15. **Histiophorus ancipitirostris**, Cuv. & Val.

*Histiophorus ancipitirostris*, CUV. & VAL. op. cit. p. 309.—GÜNTHER, op. cit. p. 512, note.

A snout (locality unknown), having a flattened surface, its width contained 19 or 20 times in its length, was the basis of Cuvier's description. Probably a species of *Tetrapturus*.

16. **Makaira nigricans**, Lacép.

*Makaira nigricans*, LACÉPÈDE, Hist. Nat. Poiss. "iv, pp. 688, 689, pl. xiii, fig. 3".—CUV. & VAL. Hist. Nat. Poiss. viii, p. 287.

*Xiphias makaira*, SHAW, Zool. iv, Fish. p. 104.

*Machæra velifera*, CUVIER, Nouv. Ann. Mus. Hist. Nat. 1832, p. 43, pl. 3.—LÜTKEN.

*Xiphias velifer*, GÜNTHER, op. cit. p. 512.

This species is undoubtedly mythical. Lütken and others have pointed out the error of arranging it, as Günther has done, with *Xiphias*. He suggests that in the specimens described by Lacépède the ventral rays were hidden in the ventral furrow, and unperceived. In this case, he remarks, it would be identical with *Histiophorus gracilirostris;* but, at all events, whether it has ventral fins or not, its right place is with the subfamily *Histiophorinæ*.

The specimen described by Lacépède was never seen by him. It was driven ashore near Rochelle, and his sole acquaintance with it was from a drawing and description given him by M. Traversay, *sous-préfet* of that town. It seems strange that so much stress has been laid upon this description and so much discussion has been held over its true classification.

## DESCRIPTIVE NOTES ON THE AMERICAN SAIL-FISH, HISTIOPHORUS GLADIS.

Strange as it may seem, the American species of *Histiophorus* has never been studied by an ichthyologist, and no attempt has ever been made to describe it, or to compare it carefully with the similar species occurring in the Indian Ocean. The identity of the two has been assumed by Dr. Günther,[*] but since no American specimens have ever been seen by this authority, I hesitate for the present to follow his lead.

This history of the Sail-fish in ichthyological literature is as follows:

The first allusion to the genus occurs in Piso's "Historia Naturalis Braziliæ", printed at Amsterdam, in 1648. In this book[†] may be found an identifiable though rough figure of the American species, accompanied by a few lines of description, which, though good, when the fact that they were written in the seventeenth century is brought to mind, are of no value for critical comparison.

The name given to the Brazilian Sail-fish by Marcgrave, the talented young German who described the fishes in the book referred to, and who afterwards sacrificed his life in exploring the unknown fields of American zoology, was *Guebucu brasiliensibus.* The use of the name *Guebucu* is interesting, since it gives a clue to the derivation of the name "Boohoo," by which this fish, and probably the Spear-fishes, are known to English-speaking sailors in the tropical Atlantic.

Sail-fishes were observed in the East Indies by Renard and Valentijn, explorers of that region from 1680 to 1720, and by other eastern voyagers. No species of the genus was, however, systematically described until 1786, when a stuffed specimen from the Indian Ocean, eight feet long, was taken to London, where it still remains in the collections of the British Museum. From this specimen M. Broussonet prepared a description, giving it the name *Scomber gladius*, rightly regarding it as a species allied to mackerel.

In 1803 Lacépède established the genus *Histiophorus* for the reception of this species.

When Cuvier and Valenciennes published the eighth volume of their Natural History of Fishes they ignored the name *gladius*, which had been given to the East Indian fish by Broussonet, redescribing it under the name *Histiophorus indicus*. At the same time they founded another species upon the figure in Piso's Natural History of Brazil, already mentioned. This they called *Histiophorus americanus*.

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[*] Catalogue of the fishes in the British Museum, ii, 1860, p. 513.

[†] 1648, Piso and Marcgrave.

Historia Naturalis | Braziliæ, | Auspicio et Beneficio | Illustrisa | Maurittii Com. Nassau | illius Provinciæ et Maris summi Præfecti Adornata: | In qua | Non tantum Plantæ et Animalia, sed et In- | digenarum morbi, ingenia et mores describuntur et | Iconibus qungentus illustrantur | (Elaborate engraved title-page, upon which the preceding inscription is inserted upon a scroll, the following upon a shell:) Lvgyn Batauorum, | Apud Franciscum Hackium | et | Amstelodami, | Apud Lud. Elzevirium 1648 | pp. (12) 122 (2) (8) 293 (7).

SECOND TITLE.

Guilielmi Pisonis, M. D. | Lugduno-Batavi, | de Medicina Braziliensi | Libri Quatuor: | I De Aëre, Aquis & Locis | II De Morbis Endemiis. | III De Venenatis & Antidotis. | IV De facultatibus Simplicium | et Georgi Marcgravi de Liebstad | Misnici Germani, | Historiæ Rerum Naturalium | Braziliæ, | Libri octa: | Quorum | Tres puores agunt de plantis | Quartus de Piscibus. | Quintus de Avibus. | Sextus de Quadrupedibus & Serpentibus | Septimus de Insectis. | Octavus de Ipsa Regione, & Illius Incolis. | Cum | Appendice de Tapuyis, et Chilensibus | Ioannes de Læt, | Antwerpianus, | In ordinem digessit & Annotationes addidit, & varies ab Auctore | Omissa supplevit & illustravit.

In a paper printed in 1833, Dr. Nardo, of Venice, proposed the establishment of a new genus allied to *Tetrapturus* and *Xiphias*, to be called *Skeponopodus*. In this he included the fish described by Marcgrave, under the name *Skeponopodus guebucu*, and also a form observed by him in the Adriatic in 1829, which he called *S. typus*. I am not aware that ichthyologists have yet learned what this may have been.*

From the time of Marcgrave until 1872 it does not appear that any zoologist had an opportunity to study a Sail-fish from America, or even from the Atlantic, yet in Günther's "Catalogue" the name *Histiophorus americanus* is discarded and the species of America is assumed to be identical with that of the Indian Ocean.†

Günther restores Lacépède's name *H. gladius* for the Indian species. Possibly, indeed probably, this name will be found to include the Sail-fish of our own coast. At present, however, it seems desirable to retain a separate name. To unite species from widely distant localities without ever having seen them, is very disastrous to a proper understanding of the problems of geographical distribution.

The materials in the National Museum consist of a skeleton and a painted plaster cast of the specimen taken near Newport, R. I., in 1872, and a drawing made of the same, while fresh, by Mr. J. H. Blake.

The occurrence of the Sail-fish is, as has been already stated, very unusual. Marcgrave saw it in Brazil as early as 1648. Sagra and Poey mention that it has been seen about Cuba, and Schomburgh includes it in his Barbados list. The specimen in the United States National Museum was taken off Newport, R. I., in 1872, and given to Professor Baird by Mr. Samuel Powell, of Newport. No others were observed in our waters until March, 1878, when, according to Mr. Neyle Habersham, of Savannah, Ga., two were taken by a vessel between Savannah and Indian River, Florida, and were brought to Savannah, where they attracted much attention in the market. In 1873, according to Mr. E. G. Blackford, a specimen in a very mutilated condition was brought from Key West to New York City.

## DESCRIPTION OF THE SUBFAMILY XIPHIINÆ AND THE GENUS XIPHIAS.

### Subfamily XIPHIINÆ, Swainson.

>*Xiphyinæ*, SWAINSON, Nat. Hist. Fish. Amphib. &c. 1839, p. 239.
>*Xiphcini*, BONAPARTE, Cat. Metod. Pesci Europei, 1846, p. 80.
*Xiphiinæ*, GILL, Canadian Naturalist, 1867, p. 250.

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* Isis, 1833, Heft iv, pp. 415–419.

†The specimens in the British Museum are catalogued as follows:

*a.* Eight feet long; stuffed. Indian Ocean. Type of the species.
*b.* Seven feet long; stuffed. Cape of Good Hope.
*c.* Dorsal fin. N. S. Wales (?). Presented by Dr. G. Bennett.
*d.* Snout; dried.

### *Diagnosis of subfamily.*

Xiphiid fishes, with bodies somewhat compressed, scaleless, or in young state covered with rough granulations. Sword flattened horizontally. Teeth absent. Pectorals sublateral. Pelvic arch and ventrals absent. A keel upon each side of the caudal peduncle. Air-bladder simple. Intestine long, sinuous. A single genus, XIPHIAS, L.

### Genus *Xiphias* Artedi.

*Xiphias*, ARTEDI, Genera Piscium, 1738, p. 29.
*Xiphias*, LINN. Syst. Nat. ed. x, 1758, p. 248; ed. xii, p. 432.
*Xiphias*, CUVIER, Règne Animal, 1817, p. 326, 1829, p. 200.
*Xiphias*, GÜNTHER, l. c.

### *Diagnosis of genus.*

Xiphiine fishes, with two dorsal fins in adult condition, the continuous dorsal of the young having become rudimentary in its median portion. Preoperculum spineless in adult, the large spine of the young disappearing at an early age. Teeth absent "except upon the pharyngeal bones, which are covered with a villosity of extremely fine and minute denticles." (*Owen.*) Number of dorsal rays probably variable. Vertebræ 26 (*Steindachner*). Branchiostegals 7. Stomach siphonal, pyloric cæca very numerous. Gall-bladder large.

HABITAT.—Tropical and temperate parts of the Atlantic, Mediterranean, New Zealand, South Pacific, and South Sea.

A single species of this genus is now known, *Xiphias gladius*, L. The species recorded in GÜNTHER's Catalogue of the Fishes in the British Museum, vol. ii, p. 512, under the name *Xiphias velifer*, if not mythical, is probably a *Histiophorus*. Lacépède's figure represents it with two caudal carinæ.

17. **Xiphias gladius**, Linnæus.

*Xiphias gladius*, LINNÆUS, Systema Naturæ, 10th ed. 1758, i, p. 248; 12th ed. 1766, i, p. 432. ("Habitat in oceano Europæ".)

BLOCH, Ichthyologie, i, 1786, pl. lxxvi, p. 23. (Habits, from statements of Chevalier Hamilton.)

GMELIN, Linn, Syst. Nat. 1788, p. 1149 (includes also under (B) the American *Histiophorus*.)

WALBAUM, Artedi, Genera Piscium, 1792, p. 207.

LACÉPÈDE, Hist. Nat. Poiss. 2d ed. 8vo. 1819, i, p. 538, fig. 2, pl. 24 (grotesque figure).

SCHNEIDER, Bloch's Systema Ichthyologiæ, 1801, p. 93 (mentions occurrence in Baltic).

SHAW, Zoology, 1804.

RISSO, Ichthyologie de Nice, 1830, p. 99 (obs. on habits): Hist. Nat. Europe Meridionale, 1826–7, iii, p. 208.

CUVIER, Règne Animal, 1 ed. 1817, p. 326; 2d ed. 1829, p. 200: Griffith's ed. 1834, p. 187, pl. xxvii, figs. 1, 2 (taken from CUV. & VAL. Hist. Nat. Poiss. 9, v), Supl. p. 349.

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STEINDACHNER, Sitzb. Ak. Wiss. Wien. 1868, p. 396 (measurement of a Spanish specimen).

HECTOR, Trans. New Zealand Institute, vii, 1873, p. 246 (occurring at Aukland) (*Ziphias* gladius).

HUTTON, Trans. New Zealand, part vii, 1873, p. 211 (second occ. at Auckland).

CHEESEMAN, Trans. New Zealand, part viii, 1875, p. 219 (*Ziphias gladius*, measurements of specimens from Shelly Bay, Auckland).

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*Xiphias Rondeletii*, LEACH, Mem. Wernerian Nat. Hist. Society ii, 1818, p. 58.

STEINDACHNER, Sitzb. Ak. Wiss. Wien. 1868, p. 396.

HUTTON, Trans. New Zealand, part viii, 1873, p. 211.

## DESCRIPTIVE NOTES ON THE SWORD FISH, XIPHIAS GLADIUS.

My notes fail to supply the necessary data for a full description of the species, and since the fish is not likely by any one to be confounded with any other, I do not think it necessary to defer publication until this data can be supplied. I append the following note upon a small specimen, and also partial measurement table for two others, one in inches, the other in millimeters.

A specimen taken off Seaconnet, July 23, 1875. Weight 113 pounds; extremity of sword gone. One of the smallest ever seen in this region.

Dorsal fin in its median part nearly destroyed, but traces of the groove and spines remaining.

*Color.*—Above rich purplish blue, shading into whitish beneath the sides, and belly with a silvery luster. Fins bluish dark with silvery sheen, except dorsal. Top of the head rich purplish blue, the color extending upon the rostrum. Lower side of rostrum rich brownish purple. Eye deep blue. No trace of scales.

*Viscera.*—Liver greenish light brown. Stomach siphonal; pyloric cæca infinite in number; intestine spiral 10 inches long when in position, 90 when stretched out. Gall-bladder large, situated on the same line with the spleen, and at same distance from the liver, connected by a duct. Air-bladder simple, large. Spermaries large, 6 inches long. Stomach contained small fish, perhaps *Poronotus*, and jaw of *Loligo Pealii*. Fluke worms in cover of stomach and air-bladder.

*Table of measurements.*

| Current number of specimen | A. | B. |
|---|---|---|
| Locality | Seaconnet, R. I., July 23, 1875. | Gloucester, Mass., 1876. |
| | Inches. | Millimeters. |
| Extreme length (tip of sword gone) | 91.00 | |
| Length to end of middle caudal rays | 81.50 | 2,040 |
| Body: | | |
| Greatest height | 13.50 | |
| Greatest circumference | 35.00 | |
| Least height of tail | | 80 |
| Head: | | |
| Greatest length | 37.00+ | |
| Length to tip of lower jaw | 16.50 | 490 |
| Greatest width | 6.75 | |
| Width of interorbital area | 4.35 | 170 |
| Length of snout | 26.00+ | |
| Length of operculum | 5.00 | 150 |
| Length of mandible | 11.00 | 310 |
| Diameter of eye | 2.75 | 80 |
| Dorsal (*first*): | | |
| Distance from tip of lower jaw | 15.50 | |
| Length of base (including first and second) | 37.00 | 470 (1st) |
| Greatest height | 12.00 | 470 |
| Dorsal (*second*): | | |
| Length of base | | 30 |
| Height at longest ray | | 75 |
| Height at last ray | 2.25 | |
| Anal: | | |
| Distance from snout | 37.00 | |
| Length of base | 12.25 | 250 |
| Height at longest ray | 8.25 | 300 |
| Height at last ray | 2.25 | |
| Caudal: | | |
| Length of middle rays | 3.50 | 160* |
| Length of external rays | 16.50 | 550 |
| Pectoral: | | |
| Distance from tip of lower jaw | 16.00 | |
| Length | 14.25 | 390 |
| Branchiostegals | 8 | |
| Dorsal | 20 (19), 2 | |
| Anal | 11 (X), 3 | |
| Pectoral | 20 | |
| Weight (pounds) | 113 | |

*From end of carina.

*Table of measurements.*

| Locality | Portland, Me., Aug. 15. |
|---|---|
| | Millimeters. |
| Extreme length | 3,990 |
| Length to end of middle caudal rays | 3,780 |
| Body: | |
| Greatest height | 638 |
| Greatest width | 470 |
| Greatest circumference | 1,705 |
| Height at origin of anal | 520 |
| Least height of tail | 120 |
| Height under second dorsal | 220 |
| Length of caudal peduncle | 238 |
| Head: | |
| Greatest length | 1,570 |
| Greatest width | 385 |
| Width of interorbital area | 223 |
| Length of snout | 1,085 (870) |
| Length of operculum | 200 |
| Length of mandible | 435 |
| Diameter of orbit | 100 |
| Dorsal (*spinous*): | |
| Distance from snout | 1,530 |
| Length of base | 500 |
| Greatest height | 550 |
| Dorsal (*soft*): | |
| Length of base | 50 |
| Distance from snout | 3,175 |
| Height | 90 |
| Distance between dorsals | 1,208 |
| Anal: | |
| Distance from snout | 2,538 |
| Length of base | 330 |
| Distance of second anal from snout | 3,125 |
| Height at longest ray | 340 |
| Caudal: | |
| Width at caudal torinæ | 500 |
| Length of external rays | 730 |
| Tip to lip of caudal | 1,140 |
| Pectoral: | |
| Distance from snout | 1,598 |
| Length | 532 |
| Weight, about (pounds) | 600 |

Steindachner has given the following measurements of two specimens obtained by him on the coast of Spain, the largest 3 feet 7 inches in length, the smallest much younger and corresponding to the young specimen figured by Cuvier and Valenciennes in the *Histoire Naturelle des Poissons*, pl. 225.*

*Table of measurements.*

| | A. | B. |
|---|---|---|
| | Inches. | Inches. |
| Total length | 43.0 | 24.6 |
| Length of head | 20.7 | 9.7 |
| Length of intermaxillary from anterior margin of eyes | 15.6½ | ........ |
| Length of mouth-opening from point of intermaxillary to posterior end of upper jaw | 17.2 | 8.0 |
| Breadth of forehead | 1.9 | 1.1½ |
| Length of under jaw | 6.0 | ........ |
| Height of body | 4.6 | 2.3½ |
| Length of pectoral | 5.8 | 3.5½ |
| Height of dorsal at first cleft rays | 6.2 | ........ |
| Greatest height of dorsal | ........ | 3.1½ |
| Length of base of dorsal | 14.4 | ........ |
| Height of anal | 8.4 | 1.11 |
| Length of base of anal | 4.6 | ........ |

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*Sitzb. Ak. Wiss. Wien, 1868, p. 396.

The following measurements were taken by T. F. Cheeseman, esq., F. L. S., from a specimen stranded in January, 1875, at Shelly Beach, New Zealand:

| | Feet. | Inches. |
|---|---|---|
| Total length from tip of snout to end of caudal fin | 11 | 3 |
| Length of snout from tip to center of eye | 3 | 11½ |
| Length of snout from tip to gape | 4 | 1 |
| Length of snout from tip to free edge of operculum | 4 | 6 |
| Length of snout from tip to nostrils | 3 | 7 |
| Length of lower jaw from point to gape | 0 | 11 |
| Projection of upper jaw over lower | 3 | 2 |
| Height of dorsal fin | 1 | 3 |
| From dorsal to caudal | 4 | 0 |
| Length of pectoral fins | 1 | 5 |
| Length of anal | 0 | 8 |
| Height of second dorsal | 0 | 2½ |
| From anal to caudal | 1 | 8 |
| Width across the tail | 2 | 3 |
| Girth just behind the eyes | 2 | 11 |
| Girth behind dorsal | 4 | 8 |
| Girth behind caudal | 0 | 11 |
| Diameter of eye | 0 | 3 |

The extreme point of the snout was broken off, about three inches being wanting.*

### GEOGRAPHICAL RANGE OF THE SWORD-FISH FAMILY.

Although it may not seem desirable at present to accept in full the views of Dr. Lütken regarding the specific unity of the Spear-fishes and the Sail-fishes of the Atlantic and Indian Oceans, it is convenient to group the different species in the way he has suggested in discussing their geographical distribution.

THE SWORD-FISH, *Xiphias gladius*, ranges along the Atlantic coast of America from Jamaica, lat. 18° N., Cuba, and the Bermudas to Cape Breton, lat. 47°. Not seen at Greenland, Iceland, or Spitzbergen, but occurring, according to Collett, at the North Cape, lat. 71°. Abundant along the coasts of Western Europe, entering the Baltic and the Mediterranean. I can find no record of the species on the west coast of Africa south of the Cape Verdes, though Lütken, who may have access to facts unknown to me, states that they occur clear down to the Cape of Good Hope, South Atlantic in mid-ocean, west coast of South America and north to Southern California, lat. 34°, New Zealand, and in the Indian Ocean off Mauritius. Good authorities state that sperm-whales, though constantly passing Cape Horn, never round the Cape of Good Hope. Can this be true in the case of the Sword-fish?

THE SAIL-FISH, *Histiophorus gladius* (with *H. americanus* and *H. orientalis*, questionable species, and *H. pulchellus* and *H. immaculatus* young), occurs in the Red Sea, Indian Ocean, Malay Archipelago, and south at least as far as the Cape of Good Hope, lat. 35° S.; in the Atlantic on coast of Brazil, lat. 30° S. to 0, and north to Southern New England, lat. 42° N.; in the Pacific to Southwestern Japan, lat. 30° to 10° N. In a general way, the range may be said to be in tropical and temperate seas, between lat. 30° S. and 40° N., and in the western parts of those seas.

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* Transactions New Zealand Institute, viii, 1875, p. 219.

THE BILL-FISH OR SPEAR-FISH, *Tetrapturus indicus* (with the various doubtful species mentioned above), occurs in the Western Atlantic from the West Indies, lat. 10° to 20° N., to Southern New England, lat. 42° N.; in the Eastern Atlantic from Gibraltar, lat. 45° N., to the Cape of Good Hope, lat. 30° S.; in the Indian Ocean, the Malay Archipelago, New Zealand, lat. 40° S., and on the west coast of Chili and Peru. In a general way, the range is between lat. 40° N. and lat. 40° S.

The species of *Tetrapturus* which we have been accustomed to call *T. albidus*, abundant about Cuba, is not very unusual on the coast of Southern New England. Several are taken every year by the Sword-fish fishermen. I have not known of their capture along the Southern Atlantic coast of the United States. All I have known about were taken between Sandy Hook and the eastern part of George's Banks.

THE MEDITERRANEAN SPEAR-FISH, *Tetrapturus belone*, appears to be a land-locked form, never passing west of the Straits of Gibraltar.

### *Fossil forms.*

Agassiz, in his work on Fossil Fishes, has described two species of *Tetrapturus:* one, *Tetrapturus priscus* (vol. v, p. 91, tab. 31), from the London Clay, in the Isle of Sheppey; the other, *Tetrapturus minor* (vol. v, p. 91, tab. 60 *a*, figs. 9–13), from the Lewes Crag. The types of the former are in the Paris Museum (others similar in the collections of Lord Enniskellen and Sir Philip Egerton); of the latter, in the collection of Mr. Mantell.

He has also described the genus *Cœlorhynchus*, from fossil fish-beaks which appear to belong to members of the Sword-fish family. These are very long, slender, tapering more gently, even, than in the living forms, and are hollow throughout the entire length. There are two species, distinguished by name, but not described, viz, *C. rectus* and *C. sinuatus*, both from the London Clay of the Isle of Shepley.

Four extinct species of *Histiophorus* have been described: *H. priscus*, Ag., from the London Clay, the beak of which is not known; *H. minor*, Ag., which has a deeply fluted beak; *H. robustus*, Leidy (Post-pliocene Foss. S. Car. p. 119, *Xiphias*), which is from the Post-pliocene of Ashley River, South Carolina, with beak much depressed, the dentigerous surface a continuous plane, separated by a deep groove; *H. antiquus* (Leidy) Cope, from the New Jersey Eocene, is also a more depressed species, with the dentary surfaces on one plane.*

At a meeting of the Boston Society, October 6, 1852, Professor Wyman exhibited three fragments of the beak of a fossil *Isthiophorus*, from the Tertiary deposits at Richmond, Va.

*Paleorhynchus*, of the schists of Glaris, has a bill like *Xiphias;* also *Hamorhynchus DesHayes*, first described by Agassiz as *Histiophorus Des Hayes*, a Scombroid with elongated bill.

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* E. D. Cope, Proc. Bost. Soc. Nat. Hist. xii, 1869, p. 311.

# ON THE NORTH AMERICAN LAND TORTOISES OF THE GENUS XEROBATES.

### By FREDERICK W. TRUE.

[Read before the Biological Society of Washington, Dec. 23, 1881.]

The land tortoises, to which this paper is intended to direct attention, are those which are found living within the borders of the United States at the present time. The species, three in number, I shall recognize under the names *Xerobates polyphemus* (Daudin) Cooper, the Gopher; *Xerobates Agassizii* Cooper, Agassiz's Tortoise, and *Xerobates Berlandieri* Agassiz, Berlandier's Tortoise.

The Gopher, to speak in general terms, inhabits the southeastern and southern parts of the United States, *Xerobates Agassizii* the southwestern portion, and *X. berlandieri* the extreme southwest and northeastern Mexico.

## I. TAXONOMY AND DESCRIPTION OF SPECIES.

HISTORY OF XEROBATES POLYPHEMUS.—In tracing the history of the first of these animals, *X. polyphemus*, we become involved at once in a whirlpool of conflicting opinion and uncertainty. The first allusion to it in zoological literature appears to be in Seba's work upon the curiosities of his museum,* where an imperfect figure is given under the name "Testudo terrestris major americana." No mention of it occurs in the tenth edition of Linnæus' Systema Naturæ, but in the interval between the publication of this edition and the twelfth the great naturalist seems to have had his attention called to Seba's figure, for in the latter edition he cites it as the last synonym under his *Testudo carolina.*† From this fact and the additional one that in the thirteenth edition of the Systema Naturæ, Gmelin, thinking to improve Linné's somewhat incomplete description of *T. carolina*, added certain remarks on the characteristics of the plastron drawn from a study of the animal portrayed in Seba's work,‡ some naturalists have thought themselves justified in regarding *T.* (or *X.*) *carolina* as the proper name for our gopher. That this is not a correct view of the case is made evident by the consideration of the first of Linné's references, the only one which occurs in the tenth edition. The citation is from George Edwards' Natural History, published between 1743 and 1751.

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*Seba, Albert. Locupletissimi rerum naturalium thesauri accurata descriptio et iconibus artificiosissimis expressio, per universam physices historiam. Amsterdam, 1734–1765, i, pl. 80, fig. 1.

†Linné, Syst. Nat., 12th ed., 1766, vol. i, p. 353.

‡Gmelin, Linn. Syst. Nat., xiii ed., i, pt. 3, 1788, p. 1041.

The phrase quoted is as follows: "Testudo tessellata minor caroliniana, Edw. Au. 205, t. 205."* On the same page in Edwards' work on which this phrase occurs, the following description (if we may trust the accuracy of Holbrook†) is given: "The lower shell is divided across the middle of the belly and joined to the upper shell on the sides by a tough flexible skin, by means of which it can, when it draws in its head and legs, close up its shell, as firmly as that of an oyster.‡ It is evident that this description was taken from a specimen of the box tortoise, denominated *Cistudo clausa* in Cope's check-list,§ but which should undoubtedly receive the name *Cistudo carolina.*

It does not seem probable that Linné would have confounded two species so distinct as the box tortoise and the gopher, if he had had definite information regarding the latter. He was undoubtedly misled by the imperfection of Seba's figure, and made to believe that it portrayed the same animal which Edwards had described.

That it may appear still more clearly that Linné's *T. carolina* is the box tortoise, I will quote the pertinent paragraph from Müller's Linné's Systema Naturæ, a translation of the 12th edition, in which extended descriptions of many animals are given. The author states in his preface that he has had access to much of the material which Linné had elaborated. The description of *Testudo carolina* is as follows:

"11. THE CAROLINA TORTOISE. *Testudo Carolina.*—This animal is named from its native country, but is also called Turapin by the English, and Terrapen by the Spaniards. It is smaller than the preceding species [*T. graeca*], and is as much tessellated, but in six-cornered pieces, and is still further distinct in that it has no tail. The color of the plates is dark brown, abundantly sprinkled with yellow patches of different sizes. The plastron is likewise different from that of the former animal, for it is cleft in the middle, and is attached to the upper shield on the sides only by skin so that it can be closed when the animal would hide himself entirely. The head is yellow and provided with scales, similar ones also being on the fore feet; the long neck and the hind feet are of bluish flesh-color. As regards the claws, there are five on the fore feet and four on the hind feet, as in the preceding species."|| This description, taken apparently from a very well preserved specimen, and coming as it does before Gmelin's unfortunate additions, leaves little doubt but that the box tortoise should bear the name *Testudo* (or *Cistudo*) *carolina.* In this opinion I am supported by Holbrook, Duméril, Strauch, Say, Harlan, and Gray, while Le Conte, Louis Agassiz, and Cope, at least in his check-list, entertain

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* Linn. Syst. Nat., 10th ed., 1758, p. 198.

† Holbrook, N. A. Herpetology, 1st ed., i, 1836, p. 45.

‡ Edwards, G. A natural history of uncommon birds, and of some other rare and nondescribed animals (= Linné's "Edw. Au."). London, 1743–'51, p. 205.

§ Cope, Bull. U. S. Nat. Museum, No. 1, 1875, p. 53.

|| Müller, P. L. S. Des Linné Vollständiges Natursystem, Third Part, 1774, pp. 44–45.

a contrary view. Gray proposed the name *T. gopher*, but many years after Daudin had given the tortoise a name.

The next mention of the gopher in literature, succeeding that occurring in Seba's unfortunate plate, is the full and tolerably accurate description given in William Bartram's account of his travels in the Southern States, published in 1791.* It is described in this work under the name "gopher." This appelation was undoubtedly first given to the animal by the Spanish settlers of Florida, the Spanish word "golfa," meaning pit or burrow, being very appropriate, as pointing to one of the most noticeable proclivities of the gopher, namely, the digging of pits or holes in the ground. The derivation of the first syllable of the word "*mun*göfa," a name given by Holbrook in later years as one in popular use, I have been unable to determine. It may be a corruption of "muñon," brawn or muscle, and refer to the great strength of the animal, or may be of African origin.

Daudin, in his Natural History of Reptiles, published in 1803,† appears not to have noticed the remarks of Gmelin upon Linné's *T. Carolina*, accepts Bartram's statement as to its being an entirely new species, gives it the name *Testudo polyphemus*, and adds a latin diagnosis. He also paraphrases Bartram's description and notes.

In later times the gopher has been described among European writers by Bosc, in 1803, under the name "La Tortue Gopher"; by Gray, in 1831, 1844, and 1855, under the names "*Testudo polyphemus*," and "*Testudo gopher*."‡ Holbrook places *T. depressa* of Cuvier, § among his synonyms of *T. polyphemus*, || but apparently without reason, for nothing relative to the tortoise except the words "*T. depressa*, Cuv." appears in that work on that page or elsewhere.

Among the earlier American zoologists who have written regarding the gopher I may mention Say, who wrote in 1825, using the name *T. polyphemus*; ¶ Le Conte, who wrote in 1829 (?), employing the name *T. carolina;* ** Harlan, who wrote in 1829, applying the name *T. polyphemus;* †† and Holbrook, who wrote in 1836 and 1842, using the name *T. polyphemus.* ‡‡

A list of all the writings in which reference to this and the remaining species of North American *Testudinidæ* indisputably occurs, such as I

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* Bartram, W. Travels through North and South Carolina, &c. Philadelphia, 1791, pp. 182–183.

† Daudin. Histoire Naturelle des Reptiles, Paris, ii, 1803 (X), pp. 256–259.

‡ Bosc. Nouv. Dict. d'Hist. Nat., xxii, 1803, p. 269.—Gray, Synopsis Reptilum, Pt. I, p. 11 (*T. polyphemus*); Gray, Tort. British Museum, 1844, p. 4 (*T. gopher*); Gray, Shield Reptiles, Pt. I, 1855, p. 5 (*T. gopher*).

§ Règne Animal, ii, p. 10.

|| Holbrook, N. A. Herpetology, 1st ed., i, 1836, p. 41.

¶ Say, Jour. Acad. Nat. Sci. iv, pl. ii, 1825, pp. 207–208.

** Le Conte, Annals Lyc. Nat. Hist., New York, iii, 1828–1836, pp. 97–100.

†† Harlan, Jour. Acad. Nat. Sci. Phila., vi, pt. i, 1829, pp. 21, 22.

‡‡ Holbrook, N. A. Herpetology, 1st ed., i, 1836, pp. 41–46; 2d ed., 1842, pp. 25–30.

have been able to make up from the literature at command, will be found at the close of this article.

ESTABLISHMENT OF THE GENUS XEROBATES.—In 1857, Louis Agassiz placed the American gophers in the new genus *Xerobates*, a distinction which has been accepted by Cope,* Gray, and other herpetologists. The characters of the genus are based on the form of the alveolar surfaces of the jaws and on the form of the fore feet and claws. The latter characters, however, in my opinion, are of less generic value than the former, since *X. Berlandieri*, which agrees with *X. polyphemus* and *X. Agassizii* in form of alveolar surface, has fore feet but little compressed; and even in the two last-named species the amount of compression varies considerably. The bluntness of the claws is due largely to the nature of the soil in which the animals live and to their habit of burrowing. The claws of the young, in all the species, are sharp, and but little compressed, although almost perfectly straight.

HISTORY OF XEROBATES AGASSIZII.—The history of the scientific discovery of the western gopher, unlike that of its eastern relative, is a very simple one. The tortoise was first made known to science by Dr. J. G. Cooper in a paper on "New Californian Animals," read before the California Academy of Sciences, July 7, 1861, and published in the second volume of the proceedings of that society, issued in 1863. The description is as follows:

"Professor Baird thinks with me that the following will undoubtedly prove a new species, after a comparison of specimens:

"XEROBATES AGASSIZII.—Agassiz's Land-Tortoise.

"*Spec. char.—Young*, with the carapax higher and more arching than in *X. carolinus*; the margin serrate all round, the primary disks of the scales projecting from a tenth to an eighth of an inch. Color of primary disks entirely pale yellow, the annual rings of growth only being dark brown. (Young just hatched, probably all yellow.)

"*Remarks.*—Closely resembles *X. carolinus*, the 'Gopher' of Florida and the other Cotton States, of which no descriptions accessible are full enough to enable me to point out all the differences. But as another species intervenes between the range of that and this one, namely, *X. berlandieri* of Agassiz, found in Southern Texas and Mexico, I feel confident that comparison of specimens will show constant distinctions between them. From *X. berlandieri* it differs even more than from *carolinus*. Besides the serrate margin, which is most distinct in my youngest specimens (four years), while Agassiz's figure of the young has no serrations, and different coloration, it has but twenty-four instead of twenty-six marginal scales (abnormal in his figured specimen?), and the primary disk of the vertebral scales is more than half as long (antero-posteriorly) as it is broad, instead of about twice as broad as long. The other scales also differ in details of form.

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*Cope, Bull. U. S. G. & G. Survey, iv, 1878, p. 393.

"Three young specimens, a male of seven years of age, two females of six and four years, obtained from the mountains of California, near Fort Mojave."*

The next account published is the very meager one contained in Cronise's "Natural Wealth of California," issued in 1868. The herpetology of this work was outlined or written, in part or entirely, by Dr. J. G. Cooper. The paragraph relating to Agassiz's Tortoise is as follows: "Agassiz's Tortoise (1. *Xerobates Agassizii*) is found only in the southeast quarter of California, which is both the driest and warmest. They grow a foot in length, and live wholly on vegetable food, closely resembling the tortoise called Gopher (*i. e.*, burrower), in the Gulf States. They are like that and most other species, eatable, but not very well flavored."†

The name *Xerobates Agassizii* alone appears again in Dr. Cooper's paper on "The Fauna of California and its Geographical Distribution," read before the California Academy, September 6, 1869,‡ and also in Cope's Check-list of Reptiles, published in 1875.§

These descriptions and allusions, together with one other to which I shall presently refer, complete, so far as I am aware, the literature of the subject. As they do not furnish sufficient data for the identification of the mature animal, I have judged it not unimportant to add a description of the species, drawn from a careful study of specimens of adults and young in the National Museum, and to point out the characters which separate it from *Xerobates polyphemus*.

DESCRIPTION OF XEROBATES AGASSIZII Cooper.—The shell is considerably depressed, and nearly flat above. Its margin is serrate all around, except in specimens worn by attrition with the soil, but most strongly behind and in front, and is quite strongly revolute over the thighs and shoulders. The center of each plate of the carapace (with the exception of the marginals) is raised, forming a sort of boss; the bosses of the anterior and penultimate vertebral plates are not prominent. The vertebral plates are five in number; the anterior hexagonal, the shortest side abutting against the nuchal plate; the second hexagonal, the posterior side longest; the third hexagonal, the anterior and posterior sides of equal length; the penultimate hexagonal, the anterior side a little the longest; the posterior hexagonal, the posterior side longest, the posterior angles very obtuse, making the plate appear almost quadrilateral. The first lateral plate is irregularly heptagonal, but the anterior angles arevery obtuse, so that the plate often appears to be quadrilateral or rudely triangular, with a rounded inferior side. The second and third laterals are heptagonal, the lower angles as before; the fourth is quadrilateral, the anterior side a little the longest. The marginal plates are twenty-four in number. The nuchal is irregularly quadrilateral, broadest behind. The supra-caudal is single, large, twice as long as high, and but slightly bulging. It stands in an almost vertical position. The first marginal plate is irregularly pentagonal; the second and third quadrilateral or pentagonal; the fourth pentagonal; the fifth quadrilateral; the sixth pentagonal; the seventh to the eleventh, inclusive, quadrilateral. All the plates are about equally striated with concentric lines.

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* Proc. Cal. Acad. Sci., ii, 1863, pp. 120, 121.

† Cronise, The Natural Wealth of California, San Francisco, 1868, p. 480.

‡ Proc. Acad. Cal. Sci., iv, 1873, p. 67.

§ Cope, Check-list N. A. Bat. & Rept., Washington, 1875, p. 54.

The sternum is very thick, and in adults extends about an inch beyond the anterior edge of the carapace. The gular plates together form an elongated pentagon, but there is sometimes a deep notch between them anteriorly. The brachial plates are quadrilateral, the free border longest; the anterior borders, which receive the posterior sides of the gular plates, together crescentic in outline. The surface of these plates, unlike that of those of *X. polyphemus*, is level in the antero-posterior direction. The thoracic plates are rudely quadrilateral, narrow, and but little expanded at their outer extremities. The abdominal plates are nearly quadrilateral, but less nearly square than in *X. polyphemus*. The femoral plates are also rudely quadrilateral, but much narrower than in *X. polyphemus*, the interior lateral border being scarcely more than half the length of the anterior side. The subcaudal plates, which do not differ from those of the eastern species, are rudely quadrilateral, the interior lateral border being a little shorter than the exterior.

These characters, as in all tortoises, are quite variable and unsatisfactory.

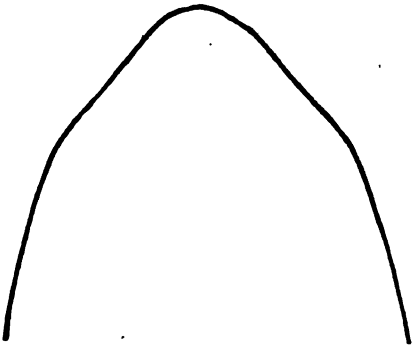

FIG. I.—X. POLYPHEMUS.

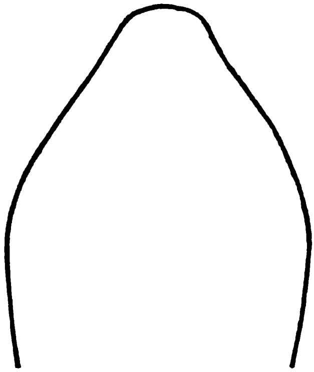

FIG. II.—X. AGASSIZII.

Contour of the head shown by passing a plane through the lowest point of the orbit parallel to the upper surface of the head.

The head is considerably compressed at the sides and elongated. Its superior surface is covered with flat scales, which decrease in size backward, and are usually divided into pairs between the eyes, and very large. The nostrils are quite small and near together, and are raised a little above the upper edge of the sheath of the upper jaw. The eyes are large and look a little forward; they are situated high in the head. The jaws are irregularly but quite finely serrated, the margins being almost in a straight line. The sheath of the upper jaw is very high, between the snout and the eye, but becomes narrowed abruptly under the eye. The neck is of moderate length, with granulated skin.

The anterior extremities are large, stout, and more or less compressed in the antero-posterior direction. The claws, five in number, are short, stout, and not curved. The scales on the anterior aspect of the arm are all approximately equal in size. Those on the exterior edge are a little larger. On the posterior surface the scales decrease in size gradually from the exterior to the interior edge.

The posterior extremities are terete, the feet elephantoid, the soles being large and round in contour. The scales surrounding the edge of the sole are large, the two posterior ones being very thick and broad. The four nails or claws resemble those of the fore feet, but show a slight tendency to curve. There are two or three prominent scales on the posterior part of the thigh.

The tail, although very short, is considerably longer than that of *X. polyphemus.*

The general color of the whole animal is brown. The centers of the plates of the carapace in the young, and in some adult specimens, is light tawny yellow. The color of the plastron is usually a little lighter than the general color of the carapace.

In this description I have followed as closely as possible that given by Dr. Holbrook, for *X. polyphemus*, in order that the two may be contrasted.

SPECIFIC DISTINCTIONS.—The leading difference in structure between *X. polyphemus* and *X. Agassizii*, one which is constant in all ages, is in the size of the fore feet as compared with the size of the hind feet. This distinction may be formulated as follows: The distance from the base of the first claw of the hind foot to the base of the fourth claw equals the distance from the base of the first claw of the fore foot to the base of the third claw in *X. polyphemus;* the fourth claw in *X. Agassizii.*

Again *X. polyphemus*, at all ages, has the anterior end of the plastron bent upward quite sharply toward the carapace, a character which does not occur in *X. Agassizii.* The inguinal plates of the former species do not usually exceed four in number—one large one and two or three small ones internal to it—and are set obliquely. Those of *X. Agassizii* are usually five or six in number—two large ones and three or four small ones between them—and are set vertically. *X. polyphemus* has one scale on the inner aspect of the knee-joint of the fore leg very much larger than the others covering that member, while in Agassiz's Tortoise all are approximately equal. This character is most noticeable in the young. The horny sheath of the upper jaw extends further back of the eye in *X. polyphemus* than in *X. Agassizii.* Other characters of less importance might be added, but these will suffice, I think, to render the two species readily distinguishable. The relative proportions of the fore and hind feet is a matter of especial importance.

HISTORY OT XEROBATES BERLANDIERI.—The third species to be considered is *Xerobates Berlandieri* Agassiz, the only published description of which is contained in Agassiz's Contributions to the Natural History of the United States, volume i, page 447. The notice is so short that I will quote it in full. It is as follows: "XEROBATES BERLANDIERI, *Ag.* The young is represented Pl. 3, fig. 17–19. It has a small yellow dot in the centre of the median and costal scales; the marginal scales are only edged with yellow. The sternum is narrower and more projecting in front than that of *X. carolinus;* in the adult it is even forked. Behind it is broader and more turned downward. The centre of the scales remains granular for a longer time. The gland of the lower jaw is larger and more prominent. This species is smaller than the preceding, and limited to southern Texas and Mexico. All the specimens that I have seen were forwarded to me for examination by the Smithsonian Institution. They were collected by the late Mr. Berlandier, a zealous French naturalist, to whom we are indebted for much of what we know of the natural history of northern Mexico."*

The use of Berlandier's name in the denomination of this species is very appropriate, since that unfortunate naturalist was not only the first to collect specimens of the tortoise, but was the first to describe it. His manuscripts, deposited in the Smithsonian Institution, contain an extended description of the animal, under the name *Testudo tuberculata*, together with a carefully-drawn figure, and some notes on its distribution.

Mention of this animal occurs in later times in the writings of Strauch,† Gray,‡ Baird,§ and Cope,‖ but, with the exception of the last two naturalists, all regard it merely as a synonym of *X. polyphemus.* Professor Baird enumerates it among others as a separate species, giving the scientific name which Agassiz has applied and the common name, "Texas Gopher." Cope also employs Agassiz's name, and adds, "I obtained a specimen of this land tortoise, collected by Mr. Marnock in the southwestern part of the State [Texas], where, according to that gentleman, it is common. He has also found it near San Antonio. I did not meet with it on the first plateau." That it is a separate species I think no one who has compared the heads of the two can doubt. The following description is intended to show that Berlandier's Tortoise is a species entirely distinct from the gopher, and not merely a variety of the latter as Strauch and some other writers have supposed.

DESCRIPTION OF XEROBATES BERLANDIERI.—Shell short and high, slightly emarginate and revolute in front, strongly incurvated behind.

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* Agassiz, Cont. Nat. Hist. U. S., i, 1857, p. 447.

† Strauch, Mem. Acad. Imp. Sci. St. Peterbourg, vii series, viii, 1865, article 13, p. 28.

‡ Gray, J. E., Proc. Zool. Soc. London, 1873, p. 723.

§ Baird, Herpetology Mex. Bound. Survey, 1859, p. 4.

‖ Cope, Bull. U. S. N. Museum, No. 17, 1880, pp. 13 and 47.

Of the five vertebral plates, the anterior is pentagonal, the two posterior angles right angles; the second and third are hexagonal, the anterior and posterior lateral margins approximately equal; the fourth is hexagonal, the posterior lateral border longer than the anterior lateral and curved inward; the fifth is hexagonal, the anterior lateral borders longest. The first lateral plate is quadrilateral (or resembles a triangle with a rounded apex), the lower border presenting rounded angles, and joined to the first four marginal plates; the second and third are hexagonal, the lower angle very obtuse; the posterior is quadrilateral and in adults nearly square. There are twenty-four marginal plates. The nuchal is small, quadrilateral, largest in front, or square; the supra-caudal is quadrilateral, but considerably less than twice as broad as high. The marginal plates differ much in different specimens. The first is rudely pentagonal, usually with an acute angle directed toward the nuchal; the remainder are irregularly quadrilateral; the sixth, however, is sometimes plainly pentagonal. In adults, the center of the eighth, ninth, tenth, and eleventh plates is usually strongly depressed, the free border being revolute.

The sternum is broad and convex at the sides, and extends an inch or less beyond the carapace in front. Each gular plate is quadrilateral. They are united, the anterior border of the resulting pentagon being invariably emarginate, often very strongly notched. The nuchal plates change shape to a remarkable degree from youth to maturity. In the newly-born animal they are broad and short, but in the adult they are narrow and elongated. The brachial are quadrangular; in the adult, both free and posterior borders convex. The thoracic are rudely quadrilateral, and very narrow at their juncture in the median line. The femoral are quadrilateral, very long and broad, covering more than a third of the sternum; the anterior and posterior borders parallel. The abdominal are rhomboidal, the exterior side longer than the interior, and convex. The sub-caudal are quadrilateral, with a notch of medium depth between them posteriorly. The axillary are usually three in number—one large one between two small ones. The inguinal are also three in number, arranged as are the axillary plates.

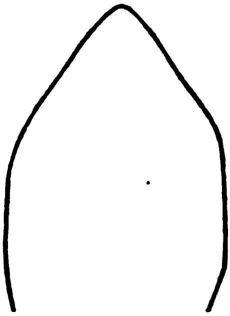
FIG. III.—X. BERLANDIERI.
Contour of head obtained as before.

The head is slightly elongated, deep, and from the eyes forward wedge-shaped; it is covered with flat scales of moderate size which in adults are approximately equal. In the young the scales on the fore part of the head are clearly larger than elsewhere and are divided into pairs, but these distinctions become unappreciable in the adult. There is usually also one very large scale over the tympanum. Nostrils moderate. Eyes large, set obliquely, and looking slightly forward; lower lid about three times as broad as the upper. Jaws short and thick; sheaths short and deep, that of the upper jaw ending under the middle of the eye; a depression beneath the eye. The two tooth-like processes at the symphysis of the lower jaw large and high, giving the cutting margin a concave outline.

Anterior extremities not greatly larger than the posterior, frequently compressed in the antero-posterior direction, but sometimes nearly terete. Five claws with stout nails. The whole anterior surface of the leg covered with very large rounded scales, approximately equal in size. Scales on the sole of the foot large.

The posterior extremities are terete and clavate, and bear four flattened, pointed nails. Scales on the heel large, two especially so.

Color of the carapace yellowish-brown, the surface within the smaller stria of each plate yellow. Sternum light dirty yellow. Head and legs yellowish gray. Jaws yellowish.

SPECIFIC DISTINCTIONS.—The main differences which separate *X. Berlandieri* from *X. polyphemus* and *X. Agassizii* relate to the size and shape of the head and jaws, the size and shape of the legs, and to the height of the shell. In *X. polyphemus* the length of the carapace is more than twice the height of the shell, while in *X. Berlandieri* the length of the former is considerably less than twice the height of the latter. In the former species the fore legs are largest at the extremity, while in the latter they are largest at the knees. In *X. polyphemus* again the cutting edge of the lower jaw is nearly straight, while in *X. Berlandieri* it is very considerably arched, giving the mouth a *hawk's bill* appearance. Many other minor differences exist in the arrangement of scales on the legs, and the like.

SIZE.—Of the three species, *X. Berlandieri* is the smallest. The adults of *X. polyphemus* and *X. Agassizii* are of about equal size. The following table gives the actual measurements of greatest length and breadth of six adult specimens:

| Species. | Locality. | Length of carapace. | Depth of shell. |
|---|---|---|---|
| *X. polyphemus:* | | *Inches.* | *Inches.* |
| No. —— | | 8½ | 3⅛ |
| No. 9627 | Florida | 8¾ | 4 |
| No. (33) | Nashville, Ga | 11 | 4¼ |
| *X. Agassizii:* | | | |
| No. 10412 | Fort Yuma, Cal. | 10 | 4¼ |
| No. —— | ——, Cal | 8¾ | 3¾ |
| *X. Berlandieri:* | | | |
| No. 8926*a*. | Brownsville, Tex | 7 | 3¾ |
| No. 8926*b* | Brownsville, Tex | 6¾ | 3⅝ |

ALLIED GENERA.—The Brazilian Tortoise, *Chelonoidis tabulata*, inhabiting the northern parts of the neotropical region, although resembling, when half grown, the species of *Xerobates*, differs from them all in characters of generic value, such as the absence of a nuchal plate, and the presence of a pit in place of a ridge in the horizontal alveolar surface of the upper jaw, at the symphysis.

FOSSIL SPECIES.—In 1878, Professor Cope placed two fossil tortoises from Kansas in the genus *Xerobates*, under the names *X. orthopygius* and *X. cyclopygius*. The skull of the latter species, however, was not found, and, the author states, "it is not certain that it belongs to the genus *Xerobates*."* *X. orthopygius*, if I understand the description correctly, is an aberrant form as far as regards its shell, and may belong to a subgenus. As I have no fragments of these animals at command I cannot speak with confidence regarding either of them.

## II. HABITS AND CAPTURE.

HABITS OF THE GOPHER.—Regarding the habits of the gopher considerable has been written by Holbrook, Bartram, Louis Agassiz, Say, and other observers and writers of less note. These all agree that it is an animal of docile nature, preferring situations of the utmost dryness and reveling in an abundance of sunshine and warmth. It has an innate repugnance to rain and all moisture, and at the approach of winter retreats to the depths of its burrow and becomes dormant. Its native home is in the sandy pine barrens of the South; far from them it is never found.

The habit of digging pits or dens in the earth seems to be peculiar to this genus of tortoises; I have been unable to find proof of any similar proclivity existing among tortoises of allied genera inhabiting other countries. "The domicile of the Gopher," observes Dr. Savage, "consists of an excavation of a size at the mouth just sufficient to admit the animal, and runs in an oblique direction to the depth of about four feet. From the entrance it enlarges and expands to a considerable extent, resembling in its interior outline a vessel of globular shape. Being concealed, it is sometimes a dangerous cavity to horsemen at full speed. It is inhabited by but one pair."†

The remarks of Rev. C. F. Knight, on the habits of this species, made before the Boston Society of Natural History, June 15, 1870, disagree somewhat with this account. He states that the gallery leading to the burrow is often sixteen feet long, sinking to a depth of twelve feet, and that the latter consists of several chambers. At the mouth of the burrow there is always a mound or hillock of considerable size, formed by the earth which the animal casts behind him in excavating.

Forbes states that gophers are sometimes forced to share their quarters with a brood of rattlesnakes, these welcome lodgers intruding themselves here as they do into the homes of the prairie dog. Rev, Mr. Knight, in the communication just referred to, affirms that, "on one

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[*] Cope, Bull. U. S. G. & G. Survey, iv, 1878, pp. 393–395.

[†] Dr. Th. Savage in Louis Agassiz's Cont. Nat. Hist. U. S., i, 1857, p. 447.

occasion, a pair of opossums, a raccoon, a rattlesnake more than six feet long, and two other snakes, besides several of the native black rats of the district (Florida) were taken from one of these holes."*

The gopher is entirely graminivorous, feeding upon various succulent vegetables and grass. It does not distinguish between wild and cultivated plants, and often causes much annoyance to planters in the South by devouring great quantities of the sweet-potato vine and other garden vegetables. It is also fond of the gum which exudes from the pine tree. It has been generally supposed that the gopher wanders from its den in search of food only at night, but the animals which Holbrook kept in confinement partook of food at all hours of the day indifferently.

There is need of more extended information regarding the breeding habits of gopher. The account of Dr. Savage, which, so far as I am aware, contains all that has been published on the subject, is not derived from personal observation, and is incomplete in some details. From him we learn, however, that the eggs are not deposited in the burrow itself, but at some point near the mouth. "The habit of the animal in oviposition, it is said, is to draw a circle on the ground about four inches in diameter, and to excavate within this to a depth of about the same number of inches, expanding as it proceeds, in a manner similar to that adopted in making its domicile. In this are deposited five white eggs, of a round form. The number being complete, the cavity is filled with earth and pressed down smoothly, and to a level with the surface, by the weight of the animal. The time in hatching is said to be between three and four weeks. The month in which they lay is June."†

The age attained by *Xerobates polyphemus* is a matter of some dispute. Some herpetologists hold that the number of concentric striæ on the dorsal scales of a tortoise form a reliable index to the number of years of its life, one ring being formed annually. But for the species under consideration, at least, I am convinced that little is to be learned from an examination of these striæ. Specimens, apparently of advanced age, are frequent in which long attrition with a sandy soil has effaced all traces of striation from the shell. Furthermore, I conceive that if the growth of the layers of the scales is connected with the phenomenon of hibernation, owing to the varying mildness of southern winters, two or more layers might be formed in a single year.

As the alligator snapper (*M. lacertina*) is the strongest of American tortoises, as regards its jaws, so the gopher, as regards its legs. That it will walk about with a man standing upon its back is a fact too commonly observed to admit of doubt. Le Conte writes that it can support a maximum weight of 600 pounds; but this statement is not derived from his own observation.

The ordinary mode of capturing the gopher is to dig a pit at the entrance of the burrow, into which the animal will fall when emerging from the latter in search of food. Wailes, however, in his report on the resources of Mississippi, gives an account of another method, which was related to him, but which it would seem must be taken *cum grano salo.* He writes: "A common box terrapin is used for the purpose, being driven into the gopher's hole, from which he is speedily driven out; but, in the eagerness of pursuit, the gopher frequently follows him so far above ground as to be cut off from his retreat and captured by the waiting hunter."[*]

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* Proc. Boston Soc. Nat. Hist., xiv, 1872, p. 16.

† Th. Savage, loc. cit.

HABITS OF AGASSIZ'S AND BERLANDIER'S TORTOISES.—Regarding the habits of Agassiz's and Berlandier's tortoises, but little has been recorded. The following notes by Mr. E. T. Cox are of recent date and point to a similarity of habits, except in the last particulars, between the eastern and western gophers. Speaking of *Xerobates Agassizii*, he says: "He is a vegetarian, feeding, as I am told, on cacti. His flesh is highly esteemed as food by the Indians and Mexicans. You will perceive that his mandibles are notched or toothed. His legs are covered with bony scales, and his front toe nails are made long and strong for digging amongst the rocks, while the hind feet are round like an elephant's. * * *

"In preparing the specimen, I found on each side, between the flesh and carapax, a large membranous sack filled with clear water; I judged that about a pint run out, though the animal had been some days in captivity and without water before coming into my possession.[†] Here then is the secret of his living in such a dry region; he carries his supply of water in two tanks. The thirsty traveler, falling in with one of these tortoises and aware of this fact, need have no fear of dying of immediate want of water."[‡]

I consider it doubtful whether Berlandier's tortoise digs burrows. The form of the legs is such that excavation by their aid would be a very tedious process. I have been unable to find any notes relating to its habits, save the single sentence in Berlandier's manuscript: "Elle est herbivore."

Its eggs, unlike those of the other species, are elliptical.

## III. GEOGRAPHICAL DISTRIBUTION.

It is somewhat difficult at the present time to work out with exactitude the geographical distribution of the three North American *Xerobates*, owing to a "plentiful lack" of citations of the exact localities in which specimens have been found. In a general way, however, little difficulty is encountered.

DISTRIBUTION OF THE GOPHER.—The National Museum has specimens of *X. polyphemus* from Saint Simon's Island, Ga. (7551); Nashville,

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[*] Wailes, Geology of Mississippi.

[†] Regarding this matter I may have somewhat to say at a later date.—F. W. T.

[‡] Amer. Nat., xv, 1881, p. 1003.

Ga.; Clear Water, Fla. (16057); Homossasa, Fla. (10069–70); Gainesville, Fla. (10471), and Brownsville, Tex. (8926), together with others labeled East Florida (7554–55–57). I have a memorandum in my possession stating that Mr. G. Brown Goode shipped 19 specimens of this animal, collected in the vicinity of Arlington, Fla., to the zoological gardens in Philadelphia. Bartram found traces of them south of the Savannah River, in Georgia and Florida. Holbrook states that they are numerous in Edgefield and Barnwell districts (S. C.), whence they extend through Georgia, Alabama, and the Floridas, and that, "According to Le Sueur, they are brought to the New Orleans market, though probably not from the immediate neighborhood."* Wailes knew of their existence in the southern part of Mississippi.

From these data it would appear that *Xerobates polyphemus* inhabits all the drier portions of the Austroriparian region, from Southern South Carolina to the Rio Grande del Norte, with the exception, perhaps, of Southern Florida. Furthermore, Gray was informed of its introduction into Cuba, where, according to Mr. W. S. MacLean, it "lives in domestication."†

DISTRIBUTION OF AGASSIZ'S TORTOISE.—Of the species *Xerobates Agassizii* the U. S. National Museum has specimens from Fort Mohave, Ariz. (6718); Dr. Cooper's types from the Solado Valley, Cal. (7888), and from Fort Yuma, Cal. (10398–99, 10412).

The distribution of this tortoise, therefore, must be limited for the present to the southern, sandy desert portions of California and Arizona.

DISTRIBUTION OF BERLANDIER'S TORTOISE.—*Testudo Berlandieri* was described by Agassiz from specimens from Northern Mexico. Berlandier writes: "It inhabits the plains of Tamaulipas between Matamoras and San Fernando de las Presas. At Laredo, on the banks of the Rio Bravo, this tortoise forms an important article of diet for the soldiers of the presidios when crossing the deserts." Cope, as we have seen, knew of specimens from San Antonio, Tex., and of the occurrence of the animal in the southwestern part of that State generally.

Its distribution, therefore, would seem to be limited to the lower regions of Texas and northeastern Mexico, between the twenty-fifth and thirtieth parallels.

## IV. SYNOPSIS OF THE SPECIES.

Terrestrial; horizontal alveolar surface of the upper jaw with two ridges; an interval at the symphysis, occupied by a transverse ridge; a notch in the lower jaw fitting over the transverse ridge. Anterior extremities more or less compressed in the antero-posterior direction; posterior extremities clavate; nails 5:4 .................... *Xerobates*.

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* Holbrook, N. A. Herp., 1st ed., i, 1836, p. 44.

† Ann. and Mag. Nat. History, 1st series, v, 1840, p. 115.

* Shell more than twice as long as high; head rounded in front; margin of jaws straight; fore-legs broadest at the extremity.

Anterior part of the plastron bent upward. Distance from base of 1st claw to base of 4th claw, hind foot, equal to distance from base of 1st claw to base of 3d claw, fore foot.....*X. polyphemus.*

Plastron level in the antero-posterior direction. Distance from base of 1st claw to base of 4th claw, hind foot, equal to distance from base of 1st claw to base of 4th claw, fore foot..*X. Agassizii.*

** Shell less than twice as long as high; head wedge-shaped in front; margin of jaws curved; fore-legs broadest at the knee..*X. Berlandieri.*

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U. S. National Museum, *Washington, January* 27, 1882.

## CATALOGUE OF A COLLECTION OF JAPANESE COTTON FIBER PRESENTED TO THE UNITED STATES NATIONAL MUSEUM BY THE GOVERNMENT OF JAPAN, TOGETHER WITH THE AMOUNT OF THE ANNUAL CROP OF JAPAN AND THE PRICE OF COTTON.*

[Prepared by the Japanese Legation.]

No. 1. Cotton produced by—
Konishi Shojiro,
Awadono mura, Soyekami-gori,
Yamato, Osaka-Fu.
Annual crop, about 225 kin = 298.14075 pounds.
Market price, 7.1 sen per 1 kin = 1.32507 pounds.

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*Note to the catalogue of the collection of cotton.—Of the suffixes to the words signifying the localities of producers, "mura" means village and "gori" township, and in the catalogue is mentioned next to the township the name of a geographical division or province, and then follows a political division.

Note to the account of cotton husbandry.—The district of Kinai, strictly speaking, comprises the provinces of Yamashiro, Yamato, Kawachi, Idsumi, and Settsu, but in the sense used in the account that district may also comprise some other neighboring provinces. The district of Kanto comprises the province of Musashi and other seven adjacent provinces. The district of Chiugoku consists of all the provinces lying south of those of Harima and Tamba and north of Nagato and Suwo. The district of Kiushiu is the whole of the island of that name. The district of Tô-oku comprises the northeastern part of the province of Ô-shiu, which is now divided into five provinces. And the district of Hokuroku includes seven provinces—Wakasa, Techizen, Kaga, Noto, Tetchiu, Techigo, and Sado.

No. 2. Cotton produced by—
Shiokawa Daigoro,
Higashi-ajiro-mura, Shibukawa-gori,
Kawachi, Osaka-Fu.
Annual crop, about 3,905 kin = 5,174.39835 pounds.
Market price, 9⅖ sen per 1 kin = 1.32507 pounds.

No. 3. Cotton produced by—
Yamada-Heishiro,
Shinmachi-mura, Sumiyoshi-gori,
Settsu, Osaka-Fu.
Annual crop, about 419 kin = 555.20433 pounds.
Market price, 11½ sen per 1 kin = 1.32507 pounds.

No. 4. Cotton produced by—
Naka Saburobeye,
Sakuratsuka-mura, Toshima-gori,
Settsu, Osaka-Fu.
Annual crop, about 334 kin = 442.57338 pounds.
Market price, 7⅘ sen per 1 kin = 1.32507 pounds.

No. 5. Cotton produced by—
Midsutani Kiyoji,
Nishikata-mura, Kuwana-gori,
Ise, Miye-ken.
Annual crop, about 276 kin = 365.71932 pounds.
Market price, 8⅗ sen per 1 kin = 1.32507 pounds.

No. 6. Cotton produced by—
Akita Heiyemon,
Uyeno-mura, Aki-gori,
Ise, Miye-ken.
Annual crop, about 1,314 kin = 1,741.14198 pounds.
Market price, 7.3 sen per 1 kin = 1.32507 pounds.

No. 7. Cotton produced by—
Tanaka Heihachi,
Shinowara-mura, Aichi-gori,
Owari, Aichi-Ken.
Annual crop, about 194 kin = 257.06358 pounds.
Market price, 8 sen per 1 kin = 1.32507 pounds.

No. 8. Cotton produced by—
Suzuki Hikozayemon,
Nakane-mura, Hadsu-gori,
Mikawa, Aichi-ken.
Annual crop, about 250 kin = 331.26750 pounds.
Market price, 7.3 sen per 1 kin = 1.32507 pounds.

No. 9. Cotton produced by—
Fukazawa Moheye,
Senakawa-mura, Anbara-gori,
Suruga, Shidsuoka-ken.
Annual crop, about 313 kin = 414.74691 pounds.
Market price, 6.7 sen per 1 kin = 1.32507 pounds.

No. 10. Cotton produced by—
Kawanishi Chojiuro,
Nanko-mura, Maka-kioma-gori,
Kai, Yamanishi-ken.
Annual crop, about 675 kin = 894.42225 pounds.
Market price, 8.3 sen per 1 kin = 1.32507 pounds.

No. 11. Cotton produced by—
Ishii Riohei,
Kamo-mura, Niiharu-gori,
Hitachi, Ibaraki-ken.
Annual crop, about 175 kin = 231.88725 pounds.
Market price, 8⅞ sen per 1 kin = 1.32507 pounds.

No. 12. Cotton produced by—
Sumigama Denbeye,
Magari-mura, Nakashima-gori,
Mino, Gifu-ken.
Annual crop, about 5,100 kin = 6,757.857 pounds.
Market price, 7⅘ sen per 1 kin = 1.32507 pounds.

No. 13. Cotton produced by—
Miyasaka Kansaku,
Riokusheki-mura, Sarashina-gori,
Shinano, Nagano-ken.
Annual crop, about 262 kin = 347.16834 pounds.
Market price, 8 sen per 1 kin = 1.32507 pounds.

No. 14. Cotton produced by—
Narita Shodayu,
Wada-mura, Ohi-gori,
Wakasa, Fukui-ken.
Annual product, about 150 kin = 198.7605 pounds.
Market price, 8.7 sen per 1 kin = 1.32507 pounds.

No. 15. Cotton produced by—
Hamada Jirokichi,
Morioka-mura, Kuwaimi-gori,
Hoki, Shimane-ken.
Annual crop, about 1,656 kin = 2,194.31592 pounds.
Market price, 8 sen per 1 kin = 1.32507 pounds.

No. 16. Cotton produced by—
Mishima Okataro,
Oki-mura, Kuboya-gori,
Bitchiu, Okayama-ken.
Annual crop, about 1,950 kin = 2,583.8865 pounds.
Market price, 9½ sen per 1 kin = 1.32507 pounds.

No. 17. Cotton produced by—
Kami-mura Kametaro,
Imatsu-mura, Chinka-gori,
Suwo, Yamaguchi-ken.
Annual crop, about 1,725 kin = 2,285.74575 pounds.
Market price, 8.7 sen per 1 kin = 1.32507 pounds.

No. 18. Cotton produced by—
Uramoto Joichiro,
Naka-mura, Amakusa-gori,
Higo, Kumamoto-ken.
Annual crop, about 2,275 kin = 3,014.53425 pounds.
Market price, 8⅔ sen per 1 kin = 1.32507 pounds.

## BRIEF ACCOUNT OF COTTON HUSBANDRY IN JAPAN.

Cotton is produced along the coasts, and where there are sandy soils in the warm parts of so-called districts Kinai, Kanto, Chiugoku, and Kiushiu; but in the most northeastern parts of so-called districts Tô-oku and Hokuriku, where frost visits very early, the soil is unsuitable for the cultivation of cotton, so that it is very rarely cultivated.

Although the era of the cultivation of cotton in the empire is yet uncertain, as there are various opinions, it is certain that the mode of the cultivation in western provinces was introduced from Kinai, and that the seeds grown in eastern provinces were brought from the province of Mikawa. It seems, however, that the modes of all the provinces westward from Kinai would have been developed in a very accurate manner and that the general objects turned to obtain more and more good crop. So it is; in the province of Settsu the crop is largest and could never be surpassed by that of all the other provinces throughout the empire, though the expenditure for the cultivation in that province is nearly two times that of another province where the expenditure is smallest, but as the staples are rather short and hard it is not suitable for the consumer for both spinning very fine yarns and weaving fine and delicate goods. In recent years cotton yarns are imported on a large scale, and on account of fine yarn being easily got, the home-produced cotton must, it seems, be spun into coarse counts for warp and used also for stuffing. Taking this as a cause, it became finally the general custom to prefer a cotton-plant which produces a larger amount of cotton wool to all the other sorts, whether the staple is long or short and hard or soft. Therefore, even in the provinces of Owari and Mikawa, the seed of western provinces has been taken and cultivated, and the natural, long and soft stapled wool could be very rarely seen in the markets. Yet in the provinces of Hitachi and Shimatsuke, &c., where fine cotton goods are manufactured, the sort of cotton-plant producing long, soft, and strong stapled wool has long been cultivated after the old custom, but, unfortunately, as the interests for planters were gradually decreased on account of the lowering price of cotton of that sort, the custom of cultivating with the seeds of western province after the mode of cultivation in that part is increasing year by year.

Cotton-plants have different names in different provinces, so that it is difficult to distinguish them readily one from another, but it is believed that there are but three sorts, the so-called Kinai, Kanto, and Ainoko. The Kanto produces long, soft, and strong stapled wool (½ inch to ⅔ inch in length), of glossy appearance, and contains 5 to 7 seeds in each cell, the size of which is large with less wool; and 3.2507 ounces of the seed cotton give .97521 ounce of ginned cotton. On the contrary, Kinai has hard and short stapled wool (¼ inch to ½ inch in length), of larger diameter and rather destitute of glossiness, and contains 8 to 11 seeds in each cell, of smaller size and covered with more wool, and 3.2507 ounces of the seed cotton yield 1.23526 ounces to 1.46281 ounces of ginned cotton. Ainoko is the result of a reciprocal acclimatization, viz, Kanto seeds (that is the seed of eastern part) being grown in Kinai district (middle part), and Kinai seeds in Kanto district, or Kinai seeds in Kiushiu (southwestern part), and Kiushiu seeds in Kinai; the properties, qualities, and lengths of the stapled wool of the former are intermediate between those of the two preceding, and those of the latter intergrade between those of the native cottons of Kinai and Kiushiu.

The mode of cultivation and manures are various according to both the soils and the climates, and also to the customs of every district. In Kinai district and the provinces of Owari, Mikawa, &c., cotton-planters like to have the cotton-plants rather short and thin instead of growing them tall and large, the rootlets spreading out fully, and in Kanto and some other districts they like to have the trunks of the plants grow tall and large, the primary root descending deeply in the ground; cultivators generally dislike the latter plan, and there is no doubt that such plants by no means give valuable returns. Agreeably to these views, it is thought that the fact that the cotton crop in Kanto could not be equal to that in Kinai is to some extent due to the mode of cultivation, which, in Kanto, has not attained great excellence; there is also the difference of the seeds.

Cottons to be presented ought to be collected for the purpose in cotton-producing districts, but in order to avoid losing time those specimens already collected from among the exhibits at the competitive exhibition of cotton and sugar, held at Osaka in last year (1880), are sent; therefore, the glossiness of the cotton-wool may be rather defective in comparison with that of the new crop.

## DESCRIPTION OF A NEW SPECIES OF XENICHTHYS (XENICHTHYS XENURUS) FROM THE WEST COAST OF CENTRAL AMERICA.

### By DAVID S. JORDAN and CHARLES H. GILBERT.

**Xenichthys xenurus**, sp. nov .(4356).

Allied to *Xenichthys californiensis* Steindachner; belonging to the group or subgenus, with the soft dorsal and anal short, not longer than the spinous dorsal.

Body rather deep, compressed; mouth very oblique; the maxillary barely reaching the vertical from the front of the pupil. Teeth in jaws small, in a band in front, which becomes a single series toward the sides; similar teeth on vomer, none on palatines or tongue.

Preorbital distinctly serrulate; preopercle evenly and finely serrate on the lower margin and on the angle, its upright edge entire above the angle; opercle terminating in two flat points. Eye very large, its diameter 2⅗ in head. Gill-rakers long and slender, about two-fifths the diameter of the eye, their number about 9+24.

Lateral line with a slight curve in front, not quite concurrent with the back.

Spinous dorsal very high, the spines slender and somewhat flexible, the fifth and longest about two-thirds length of head; notch between spinous and soft parts deep. Anal spines rather stouter than those of the dorsal, the third longest, but little shorter than the first soft ray and two-thirds the longest dorsal spine. Caudal deeply forked, the lobes elongate, the middle rays but one third the length of the lower.

Pectorals two-fifths length of head. Ventrals barely reaching vent, their length equal to the distance from the snout to the posterior margin of orbit.

Base of caudal scaly; rest of the fin as well as the dorsals and anal naked, the scaly sheath of the dorsal and anal, leaving the last three rays free.

Head 3¼ in length; depth 2⅔. D. IX–I, 11; A. III, 11; Lat. l. 51.

Color olivaceous above; silvery below.

This species is known from one specimen (No. 4356 U. S. Nat. Mus.) sent to the United States National Museum from San Salvador, where it was taken several years ago by Capt. J. M. Dow. Its small number of fin rays distinguished it at once from *X. xanti* and *X. agassizii*, while from *X. californiensis* it differs in numerous respects.

INDIANA UNIVERSITY, *November* 22, 1881.

## LIST OF ANTHROPOLOGICAL PUBLICATIONS

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**Articles on Anthropological Subjects, contributed to the Annual Reports of the Smithsonian Institution from 1863 to 1877.** Washington, published by the Smithsonian Institution, 1882. 8°, pp. X, 169; illustrated (No. 440 of Smithsonian Publications).

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## DESCRIPTION OF FIVE NEW SPECIES OF FISHES FROM MAZATLAN, MEXICO.

### By DAVID S. JORDAN and CHARLES H. GILBERT.

**Tylosurus sierrita**, sp. nov. (28162, 28265, 29227, 29377, 29378.)

Closely allied to *Tylosurus exilis* (Grd.).

Body very slender, not compressed; caudal peduncle depressed, half wider than deep, the lateral line forming a moderate keel, which is not black.

Jaws very long, slender, and fragile, as in *T. exilis*, *longirostris*, &c., the tip of the lower (as usual) projecting; length of upper jaw from eye 2¾ times length of postorbital part of head, 9 times space between nostrils; maxillary scarcely reaching vertical from front of pupil, about half of its posterior portion slipping under the preorbital; preorbital small, not extending backward to tip of maxillary.

Teeth essentially as in *T. longirostris*; an outer band of small acute teeth in each jaw, and an inner series of long, sharp, slender teeth, 50 to 60 in each jaw; middle line of lower jaw in front of tongue with a band of rasp-like teeth; no teeth on vomer; no gill-rakers.

Eye large, contained 2½ times in postorbital part of head; interorbital region with a rather broad and deep, scaly groove, widest anteriorly and extending backward to opposite middle of cheeks; behind this, the middle part of the cranium is somewhat elevated and bounded by two longitudinal ridges, which rise higher than the temporal ridges; this entire region nearly or quite destitute of scales [in *T. exilis* the middle of the top of the cranium is scarcely elevated and without longitudinal ridges, the whole region being more or less closely scaled]; scales of frontal region extending little forward of base of premaxillaries (in *T. exilis*, extending for more than one-fourth the length of the premaxillaries.) Cheeks well scaled; scales on opercle very minute.

Scales not very small, green.

Dorsal fin beginning and ending behind anal, its origin above base of fifth anal ray; anterior rays of both fins produced; median and posterior rays equal, the latter not reaching nearly to base of caudal; anal lobe higher than dorsal lobe, its height four-fifths length of postorbital part of head. Ventrals small, extending about one-third the distance to origin of anal, their insertion midway between base of median caudal rays and middle of cheeks. Pectorals broad, as long as postorbital part of head, the upper ray broad. Caudal lunate, the lower lobe the longer; the middle rays not quite twice as long as eye.

Head 2⅘ in length; depth nearly 18. D. 1, 16; A. 1, 17; P. 13; Lat. l. ca. 250.

Color; green above; white below; a dusky dorsal stripe; a silvery lateral stripe; sides of head silvery; upper part of cheeks punctulate; body and fins without dark points; a blackish half-bar between cheeks and opercles; a blackish blotch above eye and one in front of nostrils. Fins olivaceous, all more or less dusky at tip. Posterior portion of pectorals abruptly black.

This species is abundant at Mazatlan, where it is one of the common market fishes. It reaches a length of about two feet, and it is known to the Mexican fishermen as "*Sierrita.*"

It resembles its Californian representative, *Tylosurus exilis*, very closely, differing in several details, some of which are noticed above. The two species may be distinguished at sight by the color of the pectorals, which are, in *T. exilis*, plain olivaceous. The dorsal and anal lobes in the latter species are not dusky at tip.

**2. Tylosurus fodiator**, sp. nov. (28190, 28323.)

A species of large size, remarkable for the great strength of its jaws.

Body robust, subterete, as broad as deep; caudal peduncle slightly compressed, as deep or deeper than broad, the lateral line forming a low black cutaneous fold along its length.

Head very broad and strong, the cheeks nearly vertical. Interorbital space very broad, two-thirds length of postorbital part of head. Middle of top of head with a broad, shallow, nearly scaleless, longitudinal groove; sides of top of head obliquely striated and rugose, forming a prominent ridge above the eye; distance between nostrils greater than usual, more than one-sixth length of snout.

Jaws comparatively short, tapering, very stiff and not fragile; lower jaw wider and longer than upper. Both jaws with broad bands of small rasp-like teeth, which extend as small roughnesses on the sides of the jaw; within these is a series of very large teeth, compressed and knife-shaped, much stronger than in most of the species of this genus. The length of one of these teeth is not more than three times its breadth; posterior teeth in both jaws directed backward, the anterior erect. Number of large teeth about $\frac{30+30}{20+20}$; length of large teeth about one-sixth diameter of eye; no teeth on vomer. Teeth, scales, and probably bones, green. Gill-rakers obsolete.

Upper jaw, from eye, about half longer than rest of head. Eye large, 6½ in snout, 3 in postorbital part of head, and 2 in interorbital width. Only a narrow edge of the maxillary not covered by the preorbital. Cheeks closely scaled; opercles almost wholly naked. Scales extremely small.

Dorsal fin rather high in front, becoming low posteriorly, its longest rays two-fifths the length of its base, a little shorter than the postorbital part of the head. Caudal lunate, its lower lobe about one-third longer than the upper, the middle rays half longer than eye. Anal falcate, low posteriorly, its longest rays about equal to postorbital part of head.

Ventral fins long, inserted midway between middle of caudal base and middle of orbit, their length a little more than length of pectorals and equal to postorbital part of head; upper ray of pectorals broad, sharp-edged.

Head 3⅔ in length; depth 15. D. I, 19; A. I, 17; V. 6; P. 14; Lat. l. about 440.

Color green above, silvery below; fins somewhat dusky, except the anal, which is pale; cheeks and lower jaw silvery; middle line of back darker.

This species is abundant in the harbor of Mazatlan, where it is known to the fishermen as "*Aguja.*" It is seldom brought to the market, as it is not considered a good food-fish. Its strong jaws are dreaded by the fishermen, who say that it is able to thrust through the bottom of a boat. The largest specimen obtained by Mr. Gilbert (No. 28190) was 43 inches in length, and has served particularly as the type of the present description. A smaller specimen is numbered 28323.

**3. Cynoscion xanthulum**, sp. nov. (28109.)

Body moderately slender, compressed; head rather long, compressed and pointed; caudal peduncle rather slender. Eye large, 6 in head; a fourth less than interorbital width, which is slightly less than length of snout. Maxillary broad and truncate, its tip as wide as eye and reaching to just beyond its posterior margin; length of maxillary a little less than half length of head; mouth moderately oblique, the lower jaw prominent; premaxillaries in front, below level of lower edge of eye. Band of teeth in front of lower jaw narrow, becoming a single series laterally; the outer series of teeth in the upper jaw and the lateral series of teeth in the lower jaw larger than the others; upper jaw with two series of small teeth behind the outer series, and with two canines (sometimes but one), which are smaller than is usual in this genus. Gill-rakers rather short and strong, as long as pupil. Pseudobranchiæ present.

Scales small; lateral line well arched in front, becoming straight opposite the vent. First dorsal high, the spines not very slender, the third spine a little less than half length of head, nearly equal to the fourth and not very much longer than the second; soft dorsal rather high, the longest rays 2⅔ in length of head, not scaly, but with a distinct high basal sheath. Caudal fin double concave, the middle rays considerably produced, their length about two-thirds that of head. Anal rather short and high, its longest ray two-thirds length of head, its spines small but rather stout. Ventrals a little more than half length of head, reaching about half way to vent. Pectorals 1⅔ in head, not quite reaching tips of ventrals.

Head, 3⅓ in length; depth, 4⅓. D. IX–I, 20; A. II, 8; Lat. l. 86 (vertical rows of scales, the number of pores about 66); about 12 rows of scales between front of dorsal and lateral line.

Bluish above, silvery below, upper parts and more conspicuously the middle of sides, punctate with dark points; upper fins dark, their margins dusky; lining of opercle black; peritoneum white; inside of mouth bright yellow in life.

This species has many points in common with *C. album* Gthr., but is readily distinguished by its much smaller scales (about 65 in *C. album*). It is very abundant at Mazatlan, where it is one of the most highly valued and most common food-fishes.

The type (28109) is 15 inches in length.

4. **Culius æquidens**, sp. nov. (28268, 29240.)

Body elongate, depressed anteriorly, much slenderer than in *C. fuscus*, the head especially very broad and flat, longer and more depressed than in *C. fuscus*. Mouth large, broad, very oblique, the maxillary reaching nearly or quite to opposite posterior margin of eye; lower jaw considerably projecting. Length of maxillary 2⅓ in length of head. Teeth in jaws all equal, in broad bands, the outer not at all enlarged. Eye small, anterior, its length in the adult, equal to half the width of interorbital space, which is nearly one-third the length of head; a conspicuous knob at upper anterior and posterior angles of orbit; preopercular spine (as in all species of the genus) well developed, strong, compressed, directed downwards and forwards.

Scales on head very small, mostly cycloid, covering cheeks and opercles, and upper part of head to the eyes. Scales on body smaller and smoother than in most other species of the genus, those on belly much smaller than those on sides; scales on back and belly cycloid, only those on the sides of the body being distinctly ctenoid.

Pectoral fins moderate, reaching to near end of base of first dorsal, 1⅔ in head; ventrals inserted just behind axil, reaching half way to vent, and about half length of head. Interspace between dorsals about equal to diameter of eye. Soft dorsal and anal short and high, very similar, coterminous; last ray of anal a little more than half length of head. Caudal peduncle long, a little shorter than head. Caudal fin rounded, 1⅓ in head.

Head 3½ in length to base of caudal; greatest depth about 6.

D. VI—I, 8; A. I, 8; Lat. l. 60; 24 scales in an oblique series from front of soft dorsal downward and backward to anal; about 20 in a vertical series.

Color, dark, dull, olivaceous brown, paler below; younger specimens mottled below with bluish and speckled with dark brown. Sides without longitudinal stripes. Fins dusky, all of them finely mottled and speckled with darker; the dark markings on dorsal and anal forming undulated longitudinal stripes; on pectorals and ventrals forming dark bars.

This species is known to us from three specimens, the longest about a foot in length. They were obtained from near Mazatlan; according to fishermen from fresh-water at Presidio.

*Culius æquidens* apparently differs from other species of the group in the large mouth with small equal teeth, and in the small smoothish scales.

*Culius belizanus*, lately described by M. Sauvage* from Belize, is very similar, but has the teeth of the outer row enlarged.

### 5. Centropomus robalito, sp. nov. (28102, 28132, 28150, 28310, 28321, 29562, 29564.)

Allied to *Centropomus armatus* Gill; belonging to the division of the genus with large scales, and very large anal spine.

Body comparatively elongate, the back little elevated; profile from snout to base of dorsal more nearly straight than in most of the species; upper outline of head somewhat concave; nuchal region little gibbous. Mouth smaller than in *C. armatus*, the maxillary barely reaching the vertical line from the front of pupil (in *C. armatus* of the same size reaching past front of pupil), the gape contained nearly 3 times in length of head; snout long, longer than in *C. armatus*, 3½ in head; eye moderate, a little more than half length of snout; preorbital with strong retrorse serræ. Top of head narrower than in *C. armatus* and more strongly ridged; the two interior ridges on the interorbital space separated by a space little wider than the nostril, coalescing opposite the nostrils and forming a single ridge for a little distance forward to near the base of the spines of the premaxillary. Preopercle with rather distant teeth of nearly equal size on the entire length of its vertical margin; similar teeth on the horizontal part, growing larger backward; about two teeth at the angle much longer and stronger than the others.

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*Bull. Sco. Philom., Paris, 1879, 16 (reprint).

Suprascapula with five or six strong teeth. Opercular flap reaching about to front of spinous dorsal. Gill-rakers long, about two-thirds diameter of orbit.

Dorsal spines high and rather strong, but distinctly slenderer and more flexible than in *C. armatus*, their tips when depressed reaching considerably farther back than the tips of the pectorals or ventrals; third spine longest, a little less than half length of head; fourth spine but little shorter than third. Insertion of first dorsal spine a trifle nearer last ray of second dorsal than tip of snout. Second anal spine very long (slender and perfectly straight in two specimens, strong and curved in the others,) its tip about reaching base of caudal. It is much longer than third dorsal spine or than third anal spine, and is about 1½ in length of head. Third anal spine about equal to first soft ray. Caudal fin well forked. Ventral fins long, reaching in most cases scarcely to the vent. Pectorals about equalling ventrals, 1⅔ in length of head, not reaching tips of ventrals. Vent about midway between base of ventrals and middle of base of anal.

Scales large, those in front of dorsal not crowded, 10 to 14 in number (16 to 18 in *C. armatus*); 5 series between lateral line and front of spinous dorsal.

Head (with opercular flap) 2⅔ in length; depth 3½ (3¼ in *C. armatus*).

D. VIII–I, 10; A. III, 6; scales, 5–51–9.

Color olivaceous, white below; lateral line pale. Membrane of anterior dorsal spines and of second and third anal spines blackish, as in *C. armatus;* pectorals and soft parts of vertical fins somewhat dusky; ventrals plain yellowish.

This species is rather common at Mazatlan, where numerous specimens were obtained. It reaches a length of about a foot, and is known to the fishermen as "*Constantino*" or "*Robalito*", the larger species of the genus, *C. undecimalis* and *C. nigrescens*, being called "*Robalo*".

Two specimens, 29228 from Mazatlan, and 28245 taken by Lieutenant Nichols at Acapulco, differ from the others in the following respects: The anal spine is shorter, slenderer, and perfectly straight, and the ventral fins are longer, reaching well past the vent, as in *C. armatus*.

INDIANA UNIVERSITY, *December* 2, 1881.

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## NOTES ON A COLLECTION OF FISHES MADE BY CAPTAIN HENRY E. NICHOLS, U. S. N., IN BRITISH COLUMBIA AND SOUTHERN ALASKA, WITH DESCRIPTIONS OF NEW SPECIES AND A NEW GENUS (*Delolepis*).

### By TARLETON H. BEAN.

In the summer of 1881 Captain Nichols made a voyage in command of the United States Coast and Geodetic Survey steamer Hassler, through the inland waters of British Columbia and Southern Alaska, during which he preserved for the United States National Museum 31 species of fishes, all of which were received in excellent condition. Although Captain Nichols made no special effort to obtain all the species occurring in the region traversed, he succeeded in making some very important additions to our knowledge of the fauna. *Hippoglossoides Jordani*, *Psettichthys melanostictus*, and *Xiphister mucosus* have not previously been known to occur north of Puget Sound. *Gymnacanthus galeatus* was recorded with certainty only from Unalashka. *Sebastodes paucispinis* has had San Francisco as its northern limit. A new species of *Gobius* was obtained in Departure Bay, and a scaled genus of *Cryptacanthidæ* in Kingcombe Inlet, and at Wrangel. This goes to show what might be brought to light by a systematic search of the waters of Alaska.

It is due to Captain Nichols to say that no better-preserved lot of fishes has been received from any other collector.

1. **Hippoglossus vulgaris** Fleming.

29147 (120) juv. Sitka, Alaska, Sept. 13, 1881.

Length of specimen, 11$\frac{3}{8}$ inches. D. 103; A. 79, the last ray in each of these fins is double. The usual plumpness characteristic of Alaskan halibut is maintained.

2. **Hippoglossoides Jordani** Lockington.

29810 (90). Safety Cove, British Columbia, Aug. 4, 1881.

Length 14 inches. D. 99; A. 77, the last four rays of each of these fins being split. Teeth of upper jaw in two rows, the outer row having stronger teeth. Lower jaw with one row of teeth.

Taken in 16 fathoms of water. Not previously known to occur north of Puget Sound.

3. **Psettichthys melanostictus** Girard.

29809 (107). Wrangel, Alaska, Aug. 16, 1881.

Length 12½ inches. D. 81; A. 59. The first known instance of its capture in Alaska.

4. **Limanda aspera** (Pallas) Bean.

29146 (110). Wrangel, Alaska, Sept. 13, 1881.

A single example, 6$\frac{1}{5}$ inches long. On the eyed side are numerous small black blotches, involving the dorsal, anal, and caudal as well as the body. This species has the lemon color on the posterior part of the blind side just as in *L. ferruginea*. I have again compared *aspera* with *ferruginea*, and find that they are certainly congeneric.

5. **Pollachius chalcogrammus** (Pallas) Jordan & Gilbert.

29126 (82). Head of Kingcombe Inlet, Brit. Col., Aug. 2, 1881.
29127 (87). Head of Kingcombe Inlet, Brit. Col., Aug. 2, 1881.
29128 (104). Wrangel, Alaska, Aug. 17, 1881.

29126 is 10.7 inches long; 29127, 11⅜ inches; and 29128, 11⅛ inches. In these examples the eye is four-fifths as long as the snout. There are no traces of the pseudo stripes characteristic of the adult fish.

The first of these was caught in 18 fathoms, nearly fresh water.

6. **Gadus morrhua Linn.**

29124 (80) juv. Drew's Harbor, Brit. Col. July 27, 1881.
29125 (114) juv. Kygani Straits, Alaska. Sept. 1, 1881.

No. 29124 is 9.7 inches long; No. 29125 measures 9 inches. There are 19 gill-rakers on the first branchial arch, the longest of them scarcely more than one-third as long as the eye. The fish are entirely free from external parasites.

No. 29124 was taken in 12 fathoms.

### DELOLEPIS, new genus, *Cryptacanthidæ*.

Body anguilliform, moderately compressed from the vent backward; provided with small, cycloid, imbricated scales.

Vent nearly median; a small anal papilla.

Lateral line continuous, nearly straight, slightly above the middle of the body in front of the vent, median from vent backward; it consists of a series of open pores without prominent raised tubes.

Head oblong, subquadrangular, shallow concave on the vertex, naked, with the muciferous channels well developed. Snout short, obtuse. Nostrils single, tubular, close behind the intermaxillars, in a horizontal line with the middle of the eye. Eyes small, encroaching on the dorsal outline, somewhat more prominent than in *Cryptacanthodes*, separated by a moderately wide interspace and surrounded by a series of shallow pits. Mouth wide, oblique, terminal, the lower jaw projecting beyond the upper.

Lips fleshy. Intermaxillars slightly protractile, with two rows of small conical teeth, re-enforced by a few larger ones at the symphysis behind the inner row. Mandibular teeth uniserial, larger than the intermaxillar, a few additional ones at the symphysis. Vomer and palate armed with a few moderately large teeth. Tongue smooth, adherent. A few shallow pits in the under surface of the mandible, continued in a series on the posterior border of the preoperculum. Operculum unarmed.

Gill-openings wide, the membranes attached to a narrow isthmus, extending backward beyond the pectoral base, and without a projecting flap. Gills four, a wide slit behind the fourth; gill-rakers very short, obtuse, in moderate number. Pseudobranchiæ.

Branchiostegal rays, 6.

Pectoral fins short, their bases almost vertically placed and entirely below the middle of the body.

Dorsal fin commencing over the upper angle of the gill-opening and continuous with the caudal, composed entirely of spines, of which a few anterior ones are weak.

Anal fin commencing a little in front of the middle of total length, composed of a couple of spines and a large number of split rays, continuous with the caudal.

Caudal fin moderately long, pointed.

Ventrals absent.

Abdominal viscera as in *Cryptacanthodes*. The stomach is a simple straight sac. The intestine is short (three-fourths of total length in the typical species). Pyloric cæca few, short, not greatly unequal in size.

Type, *Delolepis virgatus* Bean.

The close resemblance of *Delolepis* to *Cryptacanthodes* will be at once observed. The two are nearly identical in every other respect save the dermal structure. The muciferous channels are more developed in *Cryptacanthodes*, but the arrangement is similar. *Delolepis* is, therefore, established as a distinct genus mainly on the single character of developed scales, a character which I consider of sufficient importance in this small family to serve as a basis of subdivision.

7. **Delolepis virgatus**, new species.

Captain Nichols forwarded two fine specimens of the fish which is here described: one of them taken at the head of Kingcombe Inlet, British Columbia, in 18 fathoms of nearly fresh water, August 2, 1880 (numbered 86 in the collector's list and called "eel"); the other caught at Port Wrangel, Alaska, in the latter part of August, 1880 (numbered 111 in collector's list and called "eel"). These types are numbered 29149 and 29150 in the United States National Museum Fish Register. The smaller is 470 millimeters (18$\frac{7}{10}$ inches) and the larger 795 millimeters (31$\frac{3}{10}$ inches) in length.

The body is eel-shaped, moderately compressed and tapering in its second half; its greatest height, which is about midway between pectoral and vent, contained 11 times in total length and equal to greatest width of head; greatest width of body slightly exceeds length of upper jaw. Beginning at a short distance behind the origin of the dorsal fin small, oblong, cycloid scales, closely imbricated, cover a strip of the body along the region traversed by the lateral line; the scaled area gradually widens until, from the vent backward, the whole tail is covered except a very narrow strip along the dorsal and anal fin bases.

The length of the head to end of operculum is contained from 6 to 6½ times in total length; its width and depth are nearly equal. Width of interorbital area, measured on the bone, equals length of snout and one-third of length of lower jaw. The supramaxillary extends a little behind the eye; its length is contained 3 times in distance from snout to dorsal fin. The length of lower jaw is contained 12½ times in total length. The eye is one-half as long as the snout and one-eleventh as long as the head. The nostrils are placed immediately behind the upper lip and as far apart as the limits of the interorbital space.

The dorsal fin begins at a distance from the snout equal to twice the greatest depth of head, or just over the upper angle of the gill-opening. The first spine is half as long as the 71st, which is the longest of all. The fin is continuous with the caudal.

The two anal spines are of nearly equal length, being about one-third as long as the longest anal ray. The distance of anal from snout is 3 times distance of pectoral from snout.

The caudal is developed but connate with dorsal and anal; its length is contained from 10 times to 12½ times in total length.

The distance of pectoral from snout is contained 6½ times in total length. The length of pectoral equals one-third length of head to upper angle of gill-opening.

Body of the smaller type brownish yellow, top of head brown, lips and forehead dotted with dark brown, branchiostegal membrane and lower part of head whitish, a brown stripe along lateral line, another along the back nearer to dorsal fin than to lateral line, and a third indistinct one along anal base; vertical fins, with a dark margin, which becomes wider and involves almost the whole surface posteriorly; pectoral brownish, mingled with lighter; caudal mostly dark. In the larger example the general color is violet brown, the dotting and stripes are almost black, the dark margins of the vertical fins are absent except posteriorly, and there is less whitish color on the lower parts.

*List of specimens.*

29149 (86)—(type). Kingcombe Inlet, Brit. Col. Aug. 2, 1881.
29150 (111)—(type). Wrangel, Alaska. Aug. 2, 1881.

The first was caught at the head of the inlet, in nearly fresh water, 18 fathoms.

MEASUREMENTS.

Species: *Delolepis virgatus.*

| Current number of specimen | 29149 (86) | | 29150 (111) | |
|---|---|---|---|---|
| Locality | Kingcombe Inlet, British Col. | | Port Wrangel, Alaska. | |
| | Millimeters. | 100ths of length. | Millimeters. | 100ths of length. |
| Extreme length | 470 | .......... | 795 | .......... |
| Length to end of middle caudal rays | 470 | 100 | 795 | 100 |
| Body. | | | | |
| Greatest height | 43 | 9 | 77 | 9.7 |
| Greatest width | 32 | 7 | 60 | 7.67 |
| Height at pectoral | 36 | 7.66 | 73 | 9.18 |
| Height at anus | 37 | 8 | 67 | 8.43 |
| Head. | | | | |
| Greatest length | 78 | 16.6 | 126 | 15.85 |
| Distance from snout to nape | 51 | 10.8 | 89 | 11.2 |
| Greatest width | 42 | 9 | 78 | 9.81 |
| Greatest depth | 40 | 8.5 | 71 | 9 |
| Width of interorbital area on the bone | 13 | 2.77 | 22 | 2.76 |
| Length of snout | 13 | 2.77 | 21 | 2.64 |
| Length of operculum | 23 | 5 | 38 | 4.78 |
| Length of supra-maxillary | 27 | 5.74 | 50 | 6.29 |
| Length of upper jaw | 30 | 6.38 | 55 | 7 |
| Length of mandible | 38 | 8 | 64 | 8 |
| Distance from snout to orbit | 15 | 3.19 | 26 | 3.14 |
| Diameter of orbit | 7 | 1.5 | 11 | 1.38 |

*Measurements*—Continued.

| | Milli-meters. | 100ths of length. | Milli-meters. | 100ths of length. |
|---|---|---|---|---|
| Dorsal (*spinous*). | | | | |
| Distance from snout | 80 | 17 | 148 | 18.6 |
| Length of longest spine (71st) | 19 | 4 | 29 | 3.64 |
| Length of first spine | 10 | 2.13 | 16 | 2 |
| Length of last spine | 18 | 3.83 | 25 | 3.14 |
| Anal. | | | | |
| Distance from snout | 217 | 46 | 386 | 48.55 |
| Length of first spine | 8 | 1.7 | 13 | 1.63 |
| Length of second spine | 9 | 1.91 | 16 | 2 |
| Length of first ray | 15 | 3.19 | 21 | 2.64 |
| Length of longest ray (45th) | 27 | 5.74 | 37 | 4.65 |
| Length of last ray | 21 | 4.5 | 31 | 4 |
| Caudal. | | | | |
| Length of middle rays | 47 | 10 | 64 | 8 |
| Pectoral. | | | | |
| Distance from snout | 74 | 15.83 | 125 | 15.72 |
| Length | 28 | 6 | 43 | 5.4 |
| Branchiostegals | vi | | vi | |
| Dorsal | lxxvii | | lxxv | |
| Anal | II, 47 | | II, 46 | |
| Pectoral | 13 | | 14 | |
| Number of cæcal appendages | 6 | | | |
| Length of longest appendage | 35 | | | |
| Length of shortest appendage | 15 | | | |
| Length of intestine | 360 | | | |

8. **Lumpenus anguillaris** (Pallas) Girard.

29801 (112). Wrangel, Alaska. Aug. —, 1881.

29801 (122). Sitka, Alaska. Sept. 13, 1881.

Length of first, 11 inches; of second exactly the same. Vomer without trace of teeth.

9. **Xiphister mucosus** (Girard) Jordan.

29815 (113). Wrangel, Alaska. Aug. —, 1881.

Two examples 7½ to 8 inches long. D. LXXVI; A. 49–50. In these specimens, which I have provisionally referred to *mucosus*, the occiput is equidistant from snout and dorsal; the anal origin is a little nearer the snout than the tip of caudal; the dorsal spines and anal rays are as in *X. rupestris;* the pectoral is as long as the eye. There is, consequently, a little difficulty in deciding what are the closest affinities of the examples here considered. A re-examination of all the Alaskan specimens of *X. rupestris* (so called in my preliminary catalogue, published Dec. 24, 1881) reveals a similar intermingling of the characters of *rupestris* and *mucosus* to some extent.

10. **Anoplarchus atropurpureus** (Kittlitz) Gill.

30221 (96). Port McLaughlin, Brit. Col. Aug. 6, 1881.

29814 (113). Wrangel, Alaska. Aug. —, 1881.

No. 30221, two specimens, found on the beach at low water. No. 29814 includes six individuals, of which the largest two were 4½ and 5⅝ inches long, respectively, with the following fin rays: smaller, D. 57, A. 40; larger, D. 55, A. 40.

I have examined many Alaskan specimens of *Anoplarchus* without finding one that has as many spines and anal rays as *A. alectrolophus* (Pallas) Jor. & Gilb.

11. **Murænoides ornatus** (Girard) Gill.

29813 (113). Wrangel, Alaska. Aug. —, 1881.

Ten individuals varying in length from 3½ to 7½ inches. The largest has the following radial formula; D. 87; A. II, 38.

12. **Gobius Nicholsii**, new species.

The type of the present description (catalogue number 29803, collector's number 78) was secured by Captain Nichols at Departure Bay, British Columbia, July 26, 1881. It was found at a depth of 20 fathoms.

The species is closely related to *Coryphopterus glaucofrænum* Gill but differs from this in (1) its radial formula, (2) relative proportions, and (3) coloration.

The extreme length of the single typical specimen is 112 millimeters (four and two-fifths inches).

The body is stout, compressed, its greatest height under the middle of the spinous dorsal contained 6 times in the extreme length given above. The least height of the tail is about equal to the greatest width of body. The length of caudal peduncle equals nearly one and one-half times its height.

Head scaleless, nape showing mere traces of undeveloped scales. The width of head exceeds its greatest depth and equals two-thirds of its length. The length of head is contained four and two-thirds times in extreme length. The eyes are separated by a narrow interspace equal to one half of their long diameter. The obtuse, declivous snout is about as long as the eye. Nostrils double, not tubular, close together near eye, in a line with pupil. The intermaxillaries are slightly protractile downward. The upper jaw extends to the vertical through the anterior edge of pupil; the mandible, to below middle of pupil. The eye is one-fourth as long as the head. On the vertex and nape there is an inconspicuous median fold of skin simulating a crest. The lower jaw protrudes very slightly. Teeth in the jaws slender, conical, slightly recurved, pluriserial, the outer series somewhat enlarged; no canines. Gill-openings separated by a wide isthmus.

Distance of spinous dorsal from snout equals twice length of its base, and, also, twice height of body at ventrals. The first spine equals one-half length of head. The second spine is one-half as long as base of second dorsal. The last spine is as long as lower jaw. The dorsals are separated by a very small space, scarcely equal to that between the eyes. The last two rays of the soft dorsal are almost as long as head and more than twice as long as the first ray.

The vent is midway between end of snout and origin of middle caudal rays. Anal papilla one-half as long as eye and equal to interorbital distance. The anal is similar to the soft dorsal in form and is apparently made up of rays only, the first of which is one-third as long as the last and the last but one. The last anal ray is five-sixths as long as head; it extends backward to a vertical through origin of middle caudal rays, while the last dorsal ray extends beyond this line. The anal ends slightly in advance of the end of soft dorsal.

Caudal convex behind (imperfect in the typical example), nearly as long as the head.

The middle pectoral rays are longest, about equal to length of head. None of the pectoral rays are free and silk-like.

The ventral originates immediately beneath the pectoral origin and does not reach to vent; its length equals greatest height of body (three-fourths length of head).

Br. v; D. VI, 13$\frac{1}{1}$; A. 11$\frac{1}{1}$; C. 13 (developed); P. 20; v. i, 5; L. lat. 26; L. trans. 10.

*Colors.*—Top of spinous dorsal black. Second dorsal and caudal spotted with dark color. Anal with some traces of dark color on its first half. Ventrals black. Body and tail olivaceous, a broad dusky margin on all the scales. Head colored like body but cheeks dusky and traces of purplish on side of snout.

Dedicated to Capt. Henry E. Nichols, U. S. N.

MEASUREMENTS.

Species: *Gobius Nicholsii.*

| | |
|---|---|
| Current number of specimen | 29803. |
| Locality | Departure Bay, British Columbia. |
| | Millimeters. |
| Extreme length | About 112 |
| Length to origin of middle caudal rays | 90 |
| Body: | |
| Greatest height | 19 |
| Greatest width | 12 |
| Height at ventrals | 15 |
| Least height of tail | 11 |
| Length of caudal peduncle | 15 |
| Head: | |
| Greatest length | 24 |
| Greatest width | 16 |
| Width of interorbital area | 3 |
| Length of snout | 5 |
| Length of operculum | 7 |
| Length of maxillary | 8 |
| Length of intermaxillary | 8 |
| Length of mandible | 10 |
| Long diameter of eye | 6 |
| Short diameter of eye | 5 |
| Dorsal (*spinous*): | |
| Distance from snout | 29 |
| Length of base | 14 |
| Length of first spine | 12 |
| Length of second spine | 13 |
| Length of last spine (6th) | 10 |
| (*soft*): | |
| Length of base | 26 |
| Length of first ray | 10 |
| Length of longest rays (13th and 14th) | 23 |
| Length of last ray | 23 |

MEASUREMENTS—Continued.

| | Millimeters. |
|---|---|
| Anal: | |
| Distance from snout | 51 |
| Length of base | 19 |
| Distance of vent from snout | 49 |
| Length of first ray | 7 |
| Length of longest ray (11th) | 21 |
| Length of last ray | 20 |
| Caudal: | |
| Length of middle rays | About 22 |
| Pectoral: | |
| Distance from snout | 26 |
| Length | 23 |
| Ventral: | |
| Distance from snout | 26 |
| Length | 19 |
| Branchiostegals | V |
| Dorsal | VI, 13½. |
| Anal | 12 |
| Caudal | +13+ |
| Pectoral | 20 |
| Ventral | I, 5 |
| Number of scales in lateral line | 26 |
| Number of transverse rows above lateral line | 10 |
| Number of transverse rows below lateral line | |

13. **Cottus polyacanthocephalus** Pallas.

29139 (84). Head of Kingcombe Inlet, Brit. Col. Aug. 2, 1881.
29140 (94). Port McLaughlin, Brit. Col. Aug. 5, 1881.
29141 (98). Port Simpson, Brit. Col. Aug. —, 1881.
29142 (106.) Wrangel, Alaska. Aug. —, 1881.

29139.—Length $4\frac{3}{10}$ inches. D. X, 13; A. 12; found in 18 fathoms, nearly fresh water.

29140.—Length $12\frac{3}{10}$ inches. D. X, 14; A. 12; in 14 fathoms of water.

29141.—Length $12\frac{1}{4}$ inches. D. X, 14; A. 11; in 14 fathoms. The middle preopercular spine of the right side is distinctly bifid, as a result, no doubt, of some early injury. This species sometimes has two, but usually three, developed preopercular spines.

29142.—Length 6 inches. D. IX, 14; A. 12.

14. **Gymnacanthus galeatus** Bean.

29144 (102) ♂. Chacan, Alaska. Aug. 15, 1881.
29145 (116). Sitka, Alaska. Sept. 13, 1881.

The first of these is $8\frac{1}{10}$ inches long and bears out the characters of the species fully as to armature of head, depth of body about half length of head, &c. D. XI, 16; A. 18. Ventral reaches to third anal ray. From 10 fathoms of water.

The smaller individual is $4\frac{2}{10}$ inches long, and also has the characters of the adult.

15. **Artedius notospilotus** Girard.

29143 (80). Drew's Harbor, Brit. Col. July 27, 1881.

Length 5 inches. D. IX, 17; A. 13; V. I, 3. Caught in 12 fathoms.

16. **Hemilepidotus trachurus** (Pallas) Günther.

29138 (117). Sitka, Alaska. Sept. 13, 1881.

A single example 12 inches long. D. III + VIII, $18\frac{1}{2}$; V. I, 4. Four rows of scales in dorsal band.

17. **Oligocottus maculosus** Girard.

29816 (113). Wrangel, Alaska. Aug. —, 1881.

There are two examples, the larger measuring $3\frac{1}{10}$ inches, the smaller $2\frac{7}{10}$ inches. The fin rays of both are alike: D. VIII, 17; A. 13. The first dorsal is only two-thirds as high as the second. The preopercular spine is bifid, with hooks incurved.

18. **Sebastichthys maliger** Jordan & Gilbert.

29130 (93). Port McLaughlin, Brit. Col. Aug. 5, 1881.

A large example 15 inches long and 5 inches deep. D. XII, I, 13; A. III, 7. The abdominal cavity is well supplied with tape-worm-like entozoa. The fifth dorsal spine has been broken off, so that it is little longer than the second, yet it has acquired a remarkably sharp point. This specimen is *very* much like an overgrown *caurinus*, yet it has the characters ascribed to *maliger*. Caught in 14 fathoms of water.

19. **Sebastichthys caurinus** (Rich.) Jordan & Gilbert.

29807 (77) (juv.). Departure Bay, Brit. Col. July 26, 1881.
29806 (124) (juv.). Rose Harbor, Queen Charlotte Island. Sept. 18, 1881.
29808 (103) (juv.). Chacan, Alaska. Aug. 16, 1881.

The smallest (No. 29808) is probably young *melanops;* it is $4\frac{7}{10}$ inches long and has the following fin rays: D. XII, I, 15; A. III, 8. These individuals measure $4\frac{1}{5}$, $6\frac{1}{2}$, and $6\frac{7}{10}$ inches respectively; their fin rays are: D. XII, I, 12, A. III, 6; D. XII, I, 13, A. III, 6; D. XII, I, 13, A. III, 7. Number 29807 includes 2 specimens taken in 20 fathoms.

20. **Sebastichthys ruber** (Ayres) Lockington.

29129 (115). Kygani Strait, Alaska. Sept. 1, 1881.

Length of the single specimen, 19 inches. D. XII, I, 16; A. III, 8. The mandibular knob projects $\frac{3}{10}$ of an inch forward. The longest gill-rakers are nearly one inch long, equal to the distance between the anterior pair of nostrils. There are 36 rakers on the first arch, some of them distinctly club-shaped.

21. **Sebastodes paucispinis** (Ayres) Gill.

29131 (95). Port McLaughlin, Brit. Col. Aug. 6, 1881.

Length $14\frac{3}{4}$ inches. D. XIII, I, 14; A. III, 7; V. I, 5. Caught in 14 fathoms of water.

22. **Hexagrammus asper** Steller.

29133 (97). Near Port Simpson, Brit. Col. Aug., 1881.

Length of specimen, 10 inches. The uppermost lateral line extends to the 17th dorsal spine. D. XXIII, 21; A. 24.

Captain Nichols catalogues this as from a fresh-water lake near Port Simpson.

23. **Hexagrammus superciliosus** (Pallas) Jordan & Gilbert.

29132 (125). Rose Harbor, Queen Charlotte Island. Sept. 18, 1881.

Length of specimen, 12½ inches. A brilliantly colored individual, with black, white, crimson, and brown finely contrasted. Scales decidedly ctenoid (!) except on head and pectoral bases.

24. **Hexagrammus decagrammus** (Pallas) Jordan & Gilbert.

29134 (118). Sitka, Alaska. Sept. 13, 1881.
29135 (126). Nootka Sound, Vancouver Island. Sept. 13, 1881.
29136 (127). Nootka Sound, Vancouver Island. Sept. 13, 1881.
29137 (129). Nootka Sound, Vancouver Island. Sept. 13, 1881.

29134 ♂ 13 inches long; 29135 ♂ 11⅛ inches long; 29136 ♀ 9 inches long; 29137 ♀ 12¼ inches long. The last three were caught in Friendly Cove.

25. **Anoplopoma fimbria** (Pallas) Gill.

29117 (99). Port Simpson, Brit. Col. Aug. —, 1881.
29118 (83). Head of Kingcombe Inlet, Brit. Col. Aug. 2, 1881.
29119 (105). Wrangel, Alaska. Aug. 17, 1881.

29117 is 14½ inches long; 1 D. 19; 2 D. 17; A. 18; top of second dorsal and tips of caudal white. Caught in 14 fathoms of water.

29118 measures 13¼ inches; 1 D. 19; 2 D. 19; A. 19; 18 fathoms, nearly fresh water. 29119 is 17¾ inches long; 1 D. 21; 2 D. 17; A. 18.

26. **Damalichthys argyrosomus** (Girard) Jordan & Gilbert.

29811 (128). Friendly Cove, Nootka Sound, Vancouver Island. 1881.

Fourteen inches long; D. X, 22; A. 29; L. lat., 66; L. transverse, 7+17.

27. **Mallotus villosus** (Müller) Cuv.

29812 (123). Sitka, Alaska. Sept. 13, 1881.

There are 12 specimens of this species ranging from about 4 inches to 4½ inches in length. One individual examined had: D. 14; A. 24; V. 8; P. 18.

28. **Salvelinus malma** (Walb.) Jordan & Gilbert.

29148 (100). Near Port Simpson, Brit. Col. Aug. —, 1881.

A very plump specimen, one foot in length, taken from a fresh-water lake near Port Simpson. No external parasites are present.

29. **Chimæra Colliei** Bennett.

29123 (91). ♂. Safety Cove, Brit. Col. Aug. 4, 1881.

Length, 19 inches.

30. **Raia binoculata** Girard.

29805 (92). (Head.) Safety Cove, Brit. Col. Aug. 4, 1881.
29804 (108). (Head.) Wrangel, Alaska. Aug. —, 1881.

Teeth of first, $\frac{44}{40}$; of second, $\frac{47}{45}$. The second is a much larger individual than the first. The first was caught in 16 fathoms.

31. **Squalus acanthias** Linn.

29121 (79). ♂. Drew's Harbor, Brit. Col. July 27, 1881.
29122 (81). ♂. Menzie's Bay, Brit. Col. July 31, 1881.
29120 (101). ♀. Red Bay, Alaska. Aug. 14, 1881.

Length of 29121 is 2½ feet. No. 29122 is 21½ inches long. 29120 is 29 inches long. The snout of the female is more obtuse than in the two males. All of these specimens have a low keel along the lower margin of the caudal peduncle from the end of the second dorsal to the root of the caudal, just as in Atlantic specimens.

These three dogfish were caught in 12, 5, and 12 fathoms, respectively.

UNITED STATES NATIONAL MUSEUM,
*January* 31, 1882.

## ON THE RARE RODENT, CRICETODIPUS PARVUS (BAIRD) COUES.

### BY FREDERICK W. TRUE.

At the time when Dr. Elliott Coues published his valuable monograph of the Saccomyidæ* the United States National Museum possessed but four specimens of the species *Cricetodipus parvus* Baird—two of them in bad condition—including the single type-specimen of Professor Baird. On account of this scarcity of material he was forced to speak very cautiously regarding the animal, leaving it uncertain whether it was a distinct species or merely a variety of *C. flavus* Baird.

In an interesting collection of rodents in alcohol, recently received into the Museum from Mr. Gustav Eisen, of Fresno, Cal., I found nine additional specimens of this doubtful species, seven of which are in perfect condition. A careful examination of these has convinced me that *C. parvus* is a distinct species. The averages at the bottom of the following table of measurements, compared with those given by Dr. Coues for *C. flavus*,† bring out, I think, very clearly the characteristic differences of the two species.

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* Coues. Report, U. S. Geol. Surv. of the Territories, xi, 1877. Monograph VIII, pp. 481–542.

† Coues, l. c., p. 518.

*Actual measurements in inches of six specimens of Cricetodipus parvus (Baird) Coues.*

| Catalogue number. | Locality. | Distance from tip of nose to— | | | | Tail, base to end of vertebræ. | Length of fore-foot. | Length of hind-foot. |
|---|---|---|---|---|---|---|---|---|
| | | Eye. | Ear. | Occiput. | Base of tail. | | | |
| 13401 | Fresno, Cal | .50 | .80 | 1.10 | 2.50 | 2.80 | .30 | .73 |
| 13394 | ......do | .45 | .70 | 1.00 | 2 40 | 2.80 | .30 | .72 |
| 13396 | ......do | .50 | .70 | 1.00 | 2.10 | 2.70 | .30 | .75 |
| 13397 | ......do | .50 | .75 | 1.05 | 2.10 | 2.60 | .31 | .70 |
| 13398 | ......do | .45 | .70 | 1.00 | 2.20 | 2.75 | .30 | .75 |
| 13399 | ......do | .45 | .70 | 1.00 | 2.15 | 2.50 | .30 | .70 |
| | Average | 0.475 | 0.725 | 1.03 | 2.24 | 2.68 | 0.302 | 0.725 |
| | Average given by Dr. Coues for eighteen specimens of *C. flavus*. | 0.42 | 0.74 | 0.90 | 2.07 | 2.06 | 0.30 | 0.63 |

If this table be examined, it will be perceived that in *C. parvus* (1) the head is longer by one-tenth inch than in *C. flavus*, and that (2) the eye is decidedly nearer the ear in the former species than in the latter. Furthermore, it appears that in *C. parvus* (3) the tail is always longer than the head and body, averaging about half an inch more; and that (4) the length of the hind-foot approximates closely to one-third that of the head and body, sometimes exceeding one-third. The hind-foot of *C. parvus* it will be observed does not average quite as much as Dr. Coues was led to suppose; nevertheless, it is longer than in *C. flavus*.

There is another character, which, unless I am very much deceived, will make it an easy matter to distinguish the two species from each other; I refer to the colors of the hair. In parting the hair of a specimen of *C. flavus*, along the center of the dorsal surface, from near the tip of the nose to the base of the tail, it will be seen, as Professor Baird has already observed,* that the basal portion of the hair, nearly two-thirds, is everywhere of a clear lead-color, a portion above, not as wide, buff, and the tip dusky. In *C. parvus* a decidedly different distribution obtains. The majority of the hairs of the top of the head are light buff from immediately below the tip almost or quite to the base; a smaller proportion are dusky throughout, darkest at the tip. On the neck the plumbeous color is discernible at the base of the hairs, but does not occupy more than about one-half of the total length. Posteriorly the proportion of lead-color diminishes rapidly, so that about the base of the tail it is barely perceptible, or may be said to have disappeared entirely. The tail is distinctly bicolor. The hair of *C. parvus* is coarser than that of the Yellow Pocketmouse, more inclined to be hispid, and shorter, measuring scarcely more than one-quarter of an inch at the middle of the back. In general color but little difference is observable between the two species, but when the hair is disarranged the former species appears more strongly fulvous than *C. flavus*, on account of the lack of lead-color at the base of the hairs.

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* Baird. Mammals, Pacific R. R. Survey, viii, 1857, p. 424.

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[Proceedings United States National Museum. Appendix.]

# SMITHSONIAN INSTITUTION.

## UNITED STATES NATIONAL MUSEUM.

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## No. 1.

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### PLAN OF ORGANIZATION AND REGULATIONS.

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WASHINGTON, *October* 1, 1881.

SIR: In compliance with your request, I have prepared a code of regulations for use in the National Museum, which I herewith submit to you for your criticism.

They are in large part merely formulations of the unwritten laws and usages which have guided the officers of the Museum in past years, and which have now become so numerous and complicated that it has seemed necessary to reduce them to some tangible form.

To the code of rules has been prefixed a brief statement of the scope and aims of the Museum, as already defined by yourself in the reports of the Smithsonian Institution and elsewhere.

I am, sir, yours very respectfully,

G. BROWN GOODE,
*Assistant Director.*

Prof. SPENCER F. BAIRD,
*Director National Museum.*

---

[General Order No. 3.]

UNITED STATES NATIONAL MUSEUM,
*Washington, October* 15, 1881.

The accompanying code is adopted for the government of the National Museum, and for the regulation of the operations of its officers and employees.

All the provisions of former general orders are hereby annulled, and the provisions of the present code will hold in force unless they are expressly changed by future general orders.

Officers and employees are requested to become familiar with its provisions, and to aid in carrying them out.

SPENCER F. BAIRD,
*Director U. S. National Museum.*

# ORGANIZATION AND ADMINISTRATION

OF THE

# UNITED STATES NATIONAL MUSEUM.

JANUARY 1, 1882.

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# ORGANIZATION OF THE U. S. NATIONAL MUSEUM.

## FOUNDATION AND SCOPE.

### I.

THE NATIONAL MUSEUM was organized in 1846 by the act of Congress transferring to the SMITHSONIAN INSTITUTION the custody of the "National Cabinet of Curiosities," at that time deposited in the Patent-Office Building.* These collections were, in 1857, placed in the Smithsonian building, the Regents of the Institution having accepted the trust on condition that the necessary appropriations for their maintenance should be continued by Congress.

### II.

The act above referred to provides that "all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging or hereafter to belong to the United States, which may be in the city of Washington," shall be delivered to the Regents of the Smithsonian Institution, and, together with new specimens obtained by exchange, donation, or otherwise, shall be so arranged and classified as best to facilitate their examination and study.†

The National Museum is the authorized place of deposit for all objects of natural history, mineralogy, geology, archeology, ethnology, &c., belonging to the United States or collected by the Coast and Interior Survey, the Geological Survey, or by any other parties for the Government of the United States, when no longer needed for investigations in progress.‡

### III.

The ESTABLISHMENT of the Smithsonian Institution, to which, in addition to the carrying out of the other requirements of the bequest of Smithson, is entrusted the control of the National Museum, is composed of the President of the United States and his Cabinet, the Commissioner of Patents, and a BOARD OF REGENTS, which has for its members the Vice President and Chief Justice of the United States, three members of the Senate, three members of the House of Representatives, and six other persons, not members of Congress, two of whom are residents of the city of Washington.*

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*AN ACT to establish the "Smithsonian Institution" for the increase and diffusion of useful knowledge among men. (Approved August 10, 1846; Revised Statutes, title lxxiii, sections 5579–5594.)

† Revised Statutes, section 5586.

‡ Statutes Forty-fifth Congress, third session, chap. 182, p. 394.

## IV.

The management of the National Museum is entrusted to the Secretary of the Smithsonian Institution, who is, *ex officio*, its director. He is aided by a staff of assistants, who are chosen by him, and for whose action he is responsible to the Regents.

## V.

The operations of the Museum are carried on by means of an appropriation annually made by Congress "for the care and preservation of the collections."

## VI.

The collections are stored and exhibited in the building erected for the use of the Smithsonian Institution between 1847 and 1857, and in the new building, just finished, known as the "National Museum."

## VII.

The Museum is made up, in large part, of the following materials:

1. The natural-history and anthropological collections accumulated since 1850 by the efforts of the officers and correspondents of the Smithsonian Institution.
2. The collections of the Wilkes Exploring Expedition, the Perry Expedition to Japan, and other naval expeditions.
3. The collections of the scientific officers of the Pacific Railroad Survey, the Mexican Boundary Survey, and of the surveys carried on by the Engineer Corps of the Army.
4. The collections of the United States Geological Surveys under the direction of United States Geologists Hayden, King, and Powell.
5. The collections of the United States Fish Commission.
6. The gifts by foreign governments to the Museum or to the President and other public officers of the United States, who are forbidden by law to receive them personally.
7. The collections made by the United States to illustrate the animal and mineral resources, the fisheries, and the ethnology of the native races of the country, on the occasion of the International Exhibition at Philadelphia in 1876, and the fishery collections displayed by the United States in the International Fishery Exhibition at Berlin in 1880.
8. The collections given by the governments of the several foreign

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*Revised Statutes, 5580.

nations, thirty in number, which participated in the exhibition at Philadelphia.

9. The industrial collections given by numerous manufacturing and commercial houses of Europe and America, at the time of the Philadelphia Exhibition and subsequently.

10. The material received, in exchange for duplicate specimens, from the museums of Europe, Asia, and Australasia, and from numerous institutions and collectors in North and South America.

### VIII.

As necessary adjuncts to the work of the Museum, a working library, a chemical laboratory, a photographic establishment, a workshop for taxidermy, modeling, and the preparation of skeletons, and several smaller workshops are carried on as a part of the general work of administration.

### IX.

The scientific results of the labors of the officers of the Museum, and of investigations upon the collections belonging to it, are to be found for the most part in the following works:
*Bulletin of the United States National Museum;* the
*Proceedings of the United States National Museum;* the
*Reports of the Smithsonian Institution;* the
*Smithsonian Miscellaneous Collections;* the
*Smithsonian Contributions to Knowledge;* the
*Reports of the Bureau of Ethnology of the Smithsonian Institution;* and in the
*Reports of the United States Commissioner of Fisheries;* and the
*Bulletin of the United States Fish Commission;*
also occasionally in other scientific reports of other scientific departments of the government.

## FUNCTION AND AIMS OF THE MUSEUM.

### X.

The collections in the National Museum are intended to exhibit the natural and industrial resources, primarily of the United States, and secondarily of those of the remainder of the world, for purposes of comparison.

### XI.

The activity of the Museum is exerted in three directions:

(*a*) The permanent preservation of objects already in its possession.

(*b*) The acquisition of new material.

(*c*) The utilization of material already in its possession, by its exhibition in the most instructive manner, and by the prosecution of and publication of scientific researches for which it forms the basis; by the distribution of properly-labeled duplicates of materials to colleges and other educational institutions.

The preservation of material is accomplished by means of the vigilance of the curators and the skill of the preparators.

## XII.

New material is acquired (*a*) in accordance with law, from the various government surveys and expeditions; (*b*) by gift from individuals, from other institutions, and from foreign governments; (*c*) by exchange for its duplicate specimens or publications; (*d*) by the efforts of officers of the Museum, who make collections in connection with their regular duties, or are detailed for special service of this nature; (*e*) by purchase, when appropriations are made by Congress for that purpose.

## XIII.

The treasures in the custody of the Museum are utilized to the world by exhibiting them to the public, and by encouraging investigations on the part of the officers of the Museum and other suitable persons, and facilitating the publication of the results; also by the distribution to other museums and educational institutions of duplicate specimens, which have formed the basis of scientific investigation, these being identified and labeled by the best authorities.

## XIV.

The Museum by these means fulfills a threefold function:

1. It is a *Museum of Record*, in which are preserved the material foundations of an enormous amount of scientific knowledge—the types of numerous past investigations. This is especially the case with those materials which have served as a foundation for the reports upon the resources of the United States. Types of investigations made outside of the Museum are also incorporated.

2. It is a *Museum of Research*, by reason of the policy which aims to make its contents serve as fully as possible as a stimulus to and a foundation for the studies of scientific investigators. Research is necessary in order to identify and group the objects in the most philosophical and instructive relations. Its officers are selected for their ability as investigators, as well as for their trustworthiness and abilities as custodians, and its treasures are open to the use of any honest student.

3. It is an *Educational Museum* of the broadest type, by reason of its policy of illustrating by specimens every kind of natural object and every manifestation of human thought and activity, by displaying descriptive labels adapted to the popular mind, and by its policy of distributing its publications and its named series of duplicates.

## CLASSIFICATION OF THE DEPARTMENTS.

### XV.

The following classification of the collections has been provisionally adopted:*

Division of Anthropology.
  Department I.—Art and Industry.
  Department II.—Races of men.
  Department III.—Antiquities.
Division of Zoology.
  Department IV.—Mammals.
  Department V.—Birds.
  Department VI.—Reptiles and Batrachians.
  Department VII.—Fishes.
  Department VIII.—Mollusks.
  Department IX.—Insects.
  Department X.—Crustaceans.
  Department XI.—Worms.
  Department XII.—Radiates and Protozoans.
  Department XIII.—Invertebrate Fossils.
Division of Botany.
  Department XIV.—Recent Plants.
  Department XV.—Fossil Plants.
Division of Geology.
  Department XVI.—Physical Geology.
  Department XVII.—Minerals and Rocks.
  Department XVIII.—Metallurgy and Economic Geology.
Division of Exploration and Experiment.
  Department XIX.—Exploration and Field work.
  Department XX.—Chemistry.
  Department XXI.—Experimental Physiology.
  Department XXII.—Vivaria.

To these divisions is added a sixth, the

Division of Administration.
  Department A.—Direction.
    (Supervision of routine work; Installation and labeling; Apartments and keys; Cases and furniture; Supplies; Offers, bids, and contracts; Certification of accounts; Requisitions and complaints; Assignments of work—leaves of absence; General correspondence and circulars; Supervision of other departments in division of administration; Reports.)

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* This classification is founded solely upon considerations of present convenience in Museum administration.

Department B.—Registry and Storage.

(Registry; Reception and assignment; Packing and unpacking; Shipment; Storage; Catalogues, blanks, and labels; Acknowledgments; Transportation.)

Department C.—Archives.

(Records and Registers; Files.)

Department D.—Library.

Department E.—Publication.

Department F.—Duplicates and Exchanges.

(Preparation of duplicates for distribution; Distribution of duplicates; Applications and proposals for exchanges.)

Department G.—Property and Supplies.

(Purchase; Registry; Storage; Requisitions and issue; Samples and price-lists.

Department H.—Accounts.

(Estimates; Contracts and orders; Audit; Disbursement.)

Department I.—Buildings and Labor.

(Police and inspection; Mechanics and labor; Heating and lighting; Construction and repairs; Cleaning; Public comfort.)

Department K.—Electric Service.

(Telephone service; Time service; Burglar alarm service; Watch-clock service.)

Department L.—Preparation.

(Taxidermy; Modeling; Skeleton preparation; Mounting and attaching labels; Lapidaries' work; Stone-cutting work; Draughting; Photographing; Painting; Poisoning and applying preservators.)

## CLASSIFICATION OF OFFICERS AND EMPLOYEES.

The officers and employees of the Museum are graded and designated as follows:

| Grade. | Title. | Monthly salary. |
|---|---|---|
| I. | Director | |
| II. | Assistant Director | |
| III. | Curators | |
| IV. | Assistant Curators | |
| | Preparators (7th class) | |
| V. | Assistant (2d class) | |
| | Preparator (6th class) | |
| | Mechanic (9th class) | |
| VI. | Assistant (1st class) | |
| | Preparator (5th class) | |
| | Aid (8th class) | |
| | Clerk (7th class) | |
| | Mechanic (8th class) | |
| VII | Aid (7th class) | |
| | Preparator (4th class) | |
| | Clerk (6th class) | |
| | Mechanic (7th class) | |
| VIII. | Aid (6th class) | |
| | Preparator (3d class) | |
| | Clerk (5th class) | |
| | Mechanic (6th class) | |
| IX. | Aid (5th class) | |

*Classification of officers and employés*—Continued.

| Grade. | Title. | Monthly salary. |
|---|---|---|
| IX. | Preparator (2d class) | |
| | Clerk (4th class) | |
| | Mechanic (6th class) | |
| X. | Aid (4th class) | |
| | Preparator (1st class) | |
| | Clerk (3d class) | |
| | Mechanic (5th class) | |
| XI. | Aid (3d class) | |
| | Preparator (1st class) | |
| | Clerk (3d class) | |
| | Mechanic (5th class) | |
| XII. | Aid (2d class) | |
| | Clerk (1st class) | |
| | Mechanic (4th class) | |
| XIII. | Aid (1st class) | |
| | Copyist (6th class) | |
| | Mechanic (3d class) | |
| | Watchman (3d class) | |
| XIV. | Copyist (5th class) | |
| | Mechanic (2d class) | |
| | Watchman (2d class) | |
| | Fireman (2d class) | |
| XV. | Copyist (4th class) | |
| | Mechanic (1st class) | |
| | Watchman (1st class) | |
| | Fireman (1st class) | |
| | Laborer (3d class) | |
| XVI. | Copyist (3d class) | |
| | Laborer (2d class) | |
| | Attendant (2d class) | |
| | Cleaner (2d class) | |
| XVII. | Copyist (2d class) | |
| | Messenger (4th class) | |
| | Laborer (1st class) | |
| | Attendant (1st class) | |
| | Cleaner (1st class) | |
| XVIII. | Copyist (1st class) | |
| | Messenger (3d class) | |
| XIX. | Messenger (2d class) | |
| XX. | Messenger (1st class) | |

The grading of special officers of the Museum not mentioned by title in the foregoing lists is for the present adjusted as follows:

IV. Modeler (7th class preparator).
V. Chemist (2d class assistant).
Registrar (2d class assistant).
Artist (6th class preparator).
Superintendent of Buildings (2d class assistant).
Engineer (9th class mechanic).
VIII. Electrician (6th class mechanic).
X. Taxidermist (1st class preparator).

## DUTIES OF OFFICERS.

### XVII.

*Assistant Director.*—The Assistant Director will have entire charge of everything connected with the general administration of the establishment. All requisitions for materials and supplies will be made upon him and furnished only on his approval, or in his absence upon that of the Chief Clerk of the Smithsonian Institution.

All details connected with the general administration and the routine of the Museum, the assignment of space, the construction of cases, and the recording, labeling, and installation of specimens will be in charge of the Assistant Director. He will also employ, or assign, laborers and assistants so as best to facilitate the operations of the Museum, and will co-operate with the Chief Clerk of the Smithsonian Institution in all matters in which the general interests of the establishment are concerned.

## XVIII.

*Curators.*—The Curators and Acting Curators will be held responsible for the preservation and proper use of all objects belonging to the departments under their charge. They will direct the labors of such assistants as may be assigned to them. They will receive and make entry of specimens sent them by the registrar and make the necessary reports on the accession cards upon their names and nature for use in the preparation of the "list of accessions." They will keep the collections under their charge conveniently and accessibly arranged either in the exhibition halls or in the laboratories belonging to their respective departments and will aid investigators in gaining access to specimens which they may desire to consult. They will conduct such correspondence as may be assigned to them, in accordance with the regulations laid down in the section of this document relating to correspondence.

## XIX.

*Reports of Curators.*—Curators and Acting Curators will make *monthly* reports to the Director of the Museum of the work done in their respective departments, designating its general character, the number of specimens entered or catalogued, and such details as may be necessary to furnish a current history of the operations of the Museum.

## XX.

*Assistants.*—Assistant Curators, Assistants, and Aids (above grade X) may be assigned to duty as "acting curators" of departments, in which case they are subject to curators' rules. Otherwise they will be detailed to special duty as assistants to curators or to service in the *Division of Administration.*

## XXI.

*Clerks, Copyists, and Messengers.*—Clerks, Copyists, and Messengers will be detailed to work under the direction of the chief of some department.

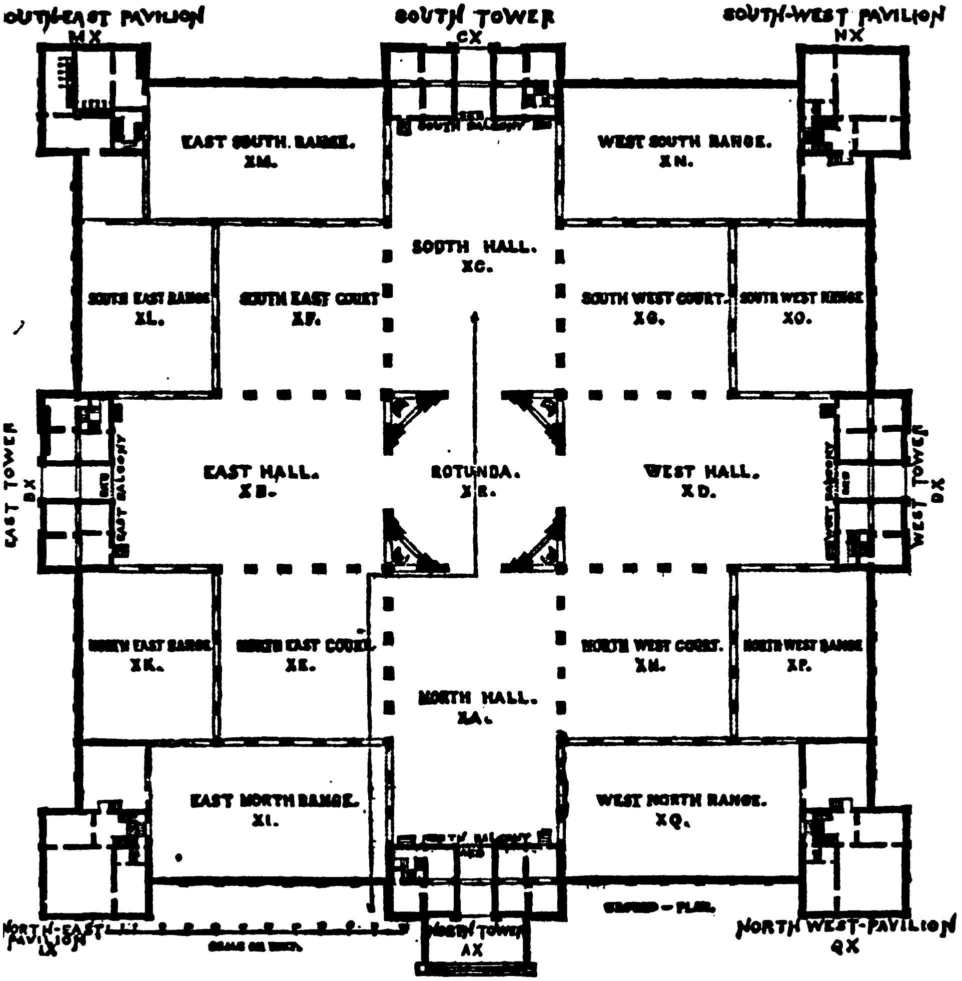
## XXII.

*Artists and Preparators.*—Artists and Preparators, when not otherwise assigned, will report for instructions to the Assistant Director.

## XXIII.

*Mechanics, Laborers, Attendants, and Cleaners.*—Mechanics, and Laborers, Attendants, Cleaners, &c., when not otherwise assigned, will report for instructions to the Superintendent of Buildings.

The duties of special officers will be explained in the regulations of the special departments.



*Plan of the National Museum, Washington, D.C.*

## BUILDINGS AND APARTMENTS.

### XXIV.

The buildings occupied by the National Museum are:

The Smithsonian Institution [in part].
The National Museum.
The Armory.
The Annex [including stable].

### XXV.

*Designation of Rooms.*—The general system by which rooms and doors are designated need not be explained here. A definite nomenclature for the different apartments or suites of apartments used in the work of the Museum is necessary and such a one is here presented, together with a code of symbols to be used in their designation. These symbols are intended for use in making assignments, in marking disposition of property upon the "Property Record," and in marking keys of cases, desks, &c.

The various apartments and suites of apartments in the buildings may be classified as follows:

*Exhibition Halls* [Symbol, X] are rooms in which objects are publicly displayed.

*Laboratories* [Symbol, L] are suites of rooms under the charge of a curator or acting curator, including his study and those of his aids, and the store-rooms and work-rooms used in connection with the laboratory, even though not adjacent.

*Depositories* [Symbol, D] are storage, file, or supply rooms in which packages or supplies are stored.

*Offices* [Symbol, O] are the places of business of executive officers.

*Work Rooms* [Symbol, W] are rooms or suites occupied by preparators or mechanics.

*Public Comfort Rooms* [Symbol, P] are retiring-rooms, waiting-rooms, restaurants, &c.

The *Exhibition Halls* are designated as follows:

#### MUSEUM BUILDING.

*Main Halls.*—These are the four arms of the cross, extending from the Rotunda to the four main entrances:

| | |
|---|---|
| North Main Hall | XA |
| East Main Hall | XB |
| South Main Hall | XC |
| West Main Hall | XD |

*Courts.*—These are the four square halls included between the Main Halls in the angles joining the Rotunda:

| | |
|---|---|
| North East Court | XE |
| South East Court | XF |
| South West Court | XG |
| North West Court | XH |

*Ranges.*—These are the outer halls, eight in number. Those on the north side are the *North Ranges*—"East North" and "West North." Those on the east side the *East Ranges*—"North East" and "South East." Those upon the south side are the *South Ranges*—"East South" and "West South." Those on the west side are the *West Ranges*—"South West" and "North West":

| | |
|---|---|
| East North Range | XI |
| North East Range | XK |
| South East Range | XL |
| East South Range | XM |
| West South Range | XN |
| South West Range | XO |
| North West Range | XP |
| West North Range | XQ |

*The Rotunda* is under the Central Dome:

| | |
|---|---|
| Rotunda | XR |

The *Pavilions* and *Towers*, though not exhibition rooms, may, if necessary, be designated by symbols corresponding to those of the main halls, by transposing the letters of the symbol of the apartment into which their doors open, *e. g.:*

| | |
|---|---|
| N. Tower | AX |
| E. Tower | BX |
| S. Tower | CX |
| W. Tower | DX |
| NE. Pavilion | IX |
| SE. Pavilion | MX |
| SW. Pavilion | NK |
| NW. Pavilion | QX |

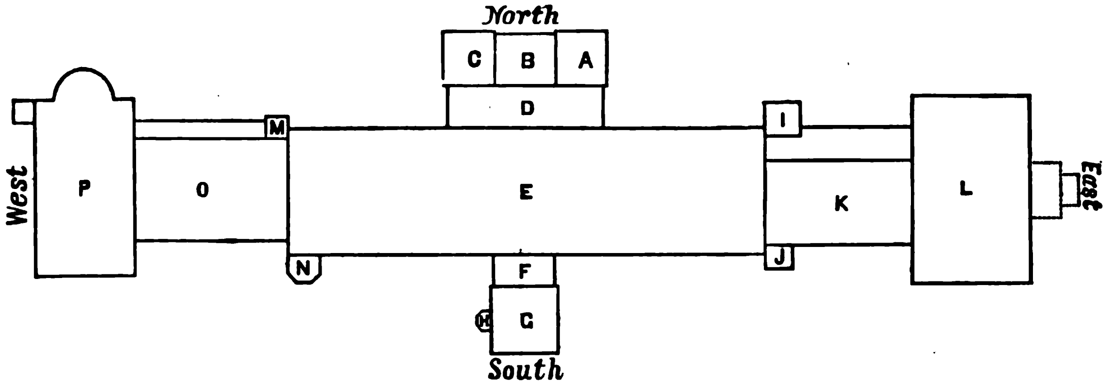
The rooms and doors in the Smithsonian Building are already classified by a very perfect system, elsewhere published.

The *Exhibition Halls* are designated as follows:

| | | |
|---|---|---|
| South Vestibule | [G and F, 1st story] | XS |
| Main Hall | [E, 1st story] | XT |
| Upper Main Hall | [E, 2d story] | XU |
| West Range | [O, 1st story] | XV |
| West Hall | [P, 1st story] | XW |
| North Vestibule | | XX |

## SMITHSONIAN BUILDING.

In this building, to conform to an early system, each part of the building, from cellar to roof, is designated by a pair of letters, and the separate apartments are designated by three letters. The general assignment of symbols is as follows:



A. North central tower, east of main entrance.
B. Space between north central towers A and C.
C. North central tower, west of main entrance.
D. Hall between north central towers and main building.
E. Main central building.
F. Space between main building and south central towers.
G. South central tower.
H. Small tower attached to west side of main south central tower.
I. Tower at at northeast corner of main building.
J. Tower at southeast corner of main building.
K. East connecting range and corridor.
L. East wing.
M. Tower at northwest corner of main building.
N. Tower at southwest corner of main building.
O. West connecting range and corridor.
P. West wing.
Q. West tower.

## XXVI.

## ASSIGNMENT OF APARTMENTS.

### LABORATORIES.

| | | |
|---|---|---|
| Art and Industry Laboratory | [QX, 3d floor] | LA |
| Archeological Laboratory | [A, B, C, 3d floor] | LB |
| Materia Medica Laboratory | [DX (North), 1st floor] | LC |
| Food Laboratory | | LD |
| Bird Laboratory | [G, 5th and 6th floors] | LE |
| Reptile Laboratory | [O (SE.), basement] | LF |
| Fish Laboratories | [P, basement]<br>[O (NE.), 1st & 2d stories]. | LG |
| Invertebrate Laboratories | [O (SW.), basement] | LH |
| | [O, (NW.), 1st story] | LI |
| Mollusk Laboratory | [A, B, C, 4th floor] | LK |
| Insect Laboratory | [MX (NE.), 2d floor] | LL |
| Annelid Laboratory | [AX (E), 3d floor] | LM |
| Paleontological Laboratory | [CX (W.), 1st floor] | LN |
| Fossil Plant Laboratory | [CX (E.), 1st floor] | LO |
| Mineral Laboratory | [DX (S.), IVX] | LP |
| Chemical Laboratory | [NX, 2d floor] | LQ |
| Photographic Laboratory | [MX, 2d and 3d floors] | LR |
| Registry Rooms | [I, J, K, L, basement] | LS |

### DEPOSITORIES.

| | | |
|---|---|---|
| Library | [QX, annex, 1st floor] | DA |
| Archive Room | [QX, first floor] | DB |
| Label Room | [QX, 2d floor] | DC |
| Sample Depository | | DD |
| Curator's Supply Deposit | [QX, annex, 2d floor] | DE |
| Bottle Deposit, No. 1 | [P, apse, basement] | DF |
| Bottle Deposit, No. 2 | [QX, basement] | DG |
| Alcohol Depository | [Q, basement] | DH |
| Superintendent's Depository | [IX, basement] | DI |
| Duplicate Depository | [K (SW.), basement] | DK |
| Modeler's Depository | [O (S.), basement] | DL |
| Temporary Storage | [L (SE.), basement] | DM |
| General Storage | [O (N.), basement] | DN |
| Private Storage | [L (NE.), basement] | DO |
| Stationery | [K ( ), 2d story] | DP |

### OFFICES.

| | |
|---|---|
| Director's Office and Office of Secretary S. I | O |
| Office Chief Clerk S. I | OA |
| Office Assistant Director | OB |
| Office of Registrar | OC |
| Office of Accountant | OD |
| Office of Superintendent of Buildings | OE |
| Office of Assistant Superintendent of Buildings | OF |

### WORK-ROOMS.

| | |
|---|---|
| Modeler's Room | WA |
| Taxidermist's Room | WB |
| Artist's Room | WC |
| Assistant Modeler's Room | WD |
| Preparator's Room | WE |
| Poisoner's Room | WF |
| Electrician's Room | WG |
| Engineer's Room and Fire-room, No. 1 (Smithsonian) | WH |
| Engineer's Room and Fire-room, No. 2 (Museum) | WI |
| Machinist's room | WK |
| Carpenter's Shop | WL |
| Painter's Room | WM |
| Stone-cutter's Room | WN |
| Lapidary's Room | WO |
| Draughtsman's Room | WP |

### PUBLIC COMFORT ROOMS.

| | |
|---|---|
| Public Comfort Room | P |
| Lunch Room | PA |
| Ladies' Reception Room | PB |
| Ladies' Lavatory, Museum | PC |
| Men's Lavatory, Museum | PD |
| Ladies' Lavatory, Smithsonian | PE |
| Ante-room, Smithsonian | PF |

## DIVISION OF ADMINISTRATION.

## DEPARTMENT OF DIRECTION.

### XXVII.

*Installation.*—The assignment of floor space and exhibition cases in the public halls, the arrangement of the cases, their interior fittings, the styles of labels and the manner of their attachment, the stands and the manner of mounting the specimens, will be under charge of the Assistant Director, who will confer upon these points with the Curators.

### XXVIII.

*Furniture.*—The construction and purchase of cases and furniture and the assignment of the same to offices and laboratories will be under the charge of the same officer.

### XXIX.

*Apartments.*—Applications for the use of apartments should be made in writing to the Assistant Director, who will submit them to the Director for approval.

## XXX.

*Use of keys.*—Keys will be issued only upon requisition, and must be receipted for. Holders of keys will be held responsible for their safe-keeping; they must not lend them or allow them to pass out of their own hands. No one will be allowed to obtain duplicates except by requisition. The loss of keys should be promptly reported. Keys not in use are to be returned to the office from which they were obtained. The loss of keys should be at once report to the Superintendent of Buildings.

## XXXI.

*Issue of keys.*—Keys to doors in the Smithsonian Building not assigned to the Museum are controlled by the Chief Clerk of the Smithsonian Institution.

Keys to doors in National Museum and other buildings will be kept by the Superintendent, who will issue them only upon requisitions indorsed by Director or Assistant Director.

Keys to exhibition cases will be kept in office of Assistant Director.

## XXXII.

*Apartments in Smithsonian Building.*—Apartments in the Smithsonian Building which may be desired for the use of the Museum may be transferred to the control of the management of the Museum by requisition from said management upon the Chief Clerk of the Smithsonian Institution.

## XXXIII.

*Catalogues.*—The following MS. Records are kept:

| Name. | Symbols. |
|---|---|
| Announcement Record | Ann. |
| Accession Records | A. |
| Card Catalogue of Accessions | A.C. |
| Distribution Records | D.– |
| Transportation Record | T. |
| Storage Record | S. |
| Property Record | P. |
| Order Book | O.– |
| Lost and Found Record | L.F. |
| Time Book | TB. |
| Visitors' Register | R. |
| Drawings, &c | Draw. |
| Electrotypes and Engravings | Eng. |
| Photographic Registers | Phot. |
| Ethnological Catalogue | C.I–III. |
| [Volumes assigned to separate departments.] | |
| Mammal Catalogue | C.IV. |
| Bird Catalogue | C.V. |

| | |
|---|---|
| Egg Catalogue | C.V-a |
| Reptile Catalogue | C.VI. |
| Fish Catalogue | C.VII. |
| Shell Catalogue | C.VIII. |
| Insect Catalogue | C.IX. |
| *i. e.*, the number of a given department affixed to the letter C. giving its symbol. Thus the Library Catalogue would be | C.D.- |

## XXXIV.

*Labeling exhibition series.*—Each object displayed in the exhibition series is to be provided with a printed label, giving (*a*) catalogue number, (*b*) names, (*c*) locality, (*d*) source of obtaining, and (*e*) such explanatory remarks as may be practicable for the purpose of enabling visitors to understand its significance.

The copy for these labels, with designation of size, according to schedule provided, should be delivered to the Assistant Director, who will attend to the printing.

## XXXV.

*Sizes of labels.*—The size of labels to be designated by the size of the space inclosed within the rectangular rule which surrounds the legend upon each label.

The margin outside of this rule to vary as may be necessary, in accordance with the size of the card.

The size of the label to be designated by two letters; the first indicating height, the second length.

The unit of measurement to be one inch.

The larger cards to be multiples of the unit.

The letters shall stand for the numbers in order as follows: A = 1; B = 2; C = 3, &c.

A card 2 inches square would be BB; 3×6 inches, CF; a card 6×3, FC, &c., &c.

Labels to be printed on thick card-board, unglazed, of some soft neutral tint.

## XXXVI.

*Plans for installation and arrangement.*—The collections in the National Museum are now being assorted and rearranged, for the purpose of placing on exhibition a selected series of objects which shall be of interest to visitors, and of making the remainder serviceable for purposes of scientific and technological investigation. A large portion of the most interesting material has never yet been exhibited on account of lack of space.

The following general principles have been adopted in this work:

1. No object will be placed on exhibition which is not of evident educational value, and likely to interest and instruct a considerable percentage of the persons visiting the Museum.

2. The exhibition of duplicate material is to be avoided.

3. Each object will be placed in a case of the form best suited for its effective display, and the light, color of the background, &c., will be so adjusted as to show it to best possible advantage, and with the least possible fatigue to the eyes of the visitor.

4. Each object, or group of objects, will be accompanied by a large, plainly printed label, which will give a concise description of what is shown, an account of its origin and uses, a synopsis of its history, and the name of the person or organization contributing it to the Museum.

5. The objects will be grouped together in systematic order, and each case will be provided with a general descriptive label. In the case of collective exhibits, the general label may also give the name of the contributor.

6. The specimens will be illustrated and supplemented by pictures, diagrams, books, and maps, in such manner that the Museum will form an encyclopedia, the illustrations for which are in the exhibition cases, the text in the labels.

7. Guide-book manuals of the different departments will be published, which will embody in concise and systematic form the information given by the specimen labels, together with such illustrative material as may seem necessary to present in addition.

## XXXVII.

*Use of material for investigation.*—Persons not officers of the Museum may obtain access to the collections for purposes of study by filing an application, which must be indorsed by the Director. Such investigations must be conducted in the Museum buildings, and the Curator of each department is required to see that the materials are properly used, without loss to the Museum.

## XXXVIII.

*Loans of material.*—No collections will be sent out of the city for study, except to officers of other museums, and then only by special arrangement.

## XXXIX.

*Announcement of proposed investigations.*—It is strongly recommended that officers of the Museum contemplating the prosecution of investigations upon special groups in the departments under their charge file statements of their intention, in order to secure priority in the use of material.

## XL.

*Property receipts.*—The following form of "receipt" from naturalists who may borrow its material, has been adopted by the Institution:

[Locality ———, date ———.]

"Received from the Smithsonian Institution a collection of ———, corresponding to the accompanying list. I hereby accept them in trust upon the following conditions: First. That they are to be used for purposes of investigation, and returned in as good condition as they were received, and as soon as my work upon them is completed. Second. That no unique specimens constituting part of the reserve series of the National Museum shall be mutilated. Third. That duplicates when necessary may be dissected, understanding by 'duplicate' a specimen which is not necessary to illustrate variations of form or range of geographical distribution. Fourth. That the specimens when returned shall be labeled with the names which I have employed in my publications upon them. Fifth. That credit shall be given to the Smithsonian Institution in all publications based upon material furnished by it."

[Signature of borrower.]

### COMPLAINTS.

### XLI.

Any failure on the part of an officer or employé to properly perform his duties should be promptly reported in writing to the Director; also to the Assistant Director any losses of specimens, or any damages received by specimens in the Museum or in packing and transit.

### PASSES AND PERMITS.

### XLII.

Passes for individuals and permits to remove articles must be signed by the Director, the Assistant Director, or the Chief Clerk of the Smithsonian Institution.

### CORRESPONDENCE.

### XLIII.

Correspondence of a formal or complimentary character, transmitting specimens or books, acknowledging gifts or courtesies, making arrange, ments for exchanges, &c., &c., as well as all announcements, circulars and communications of general importance will be signed by the Director, who may request any officer of the Museum to prepare such writing.

Letters of an informal character should be signed by the officer to whom they are referred, the signatures being accompanied by the signers' official title.

All correspondence relating to the general administration of the Museum will be in charge of the Assistant Director and the Registrar.

The Curator of each department will attend to correspondence relating especially to the matters under his charge.

Copies of all official letters must be kept either in copy book or stylograph book, and these books shall constitute a part of the archives of the Museum.

When the symbol A is marked upon a letter it signifies that an answer is to be prepared for the signature of the Director. When the symbol is *a*, it means that the answer is to be signed by the person to whom it is referred.

All letters referred are to be returned to the officer from whom they are received. If a copy of any letter, or portion of letter, is desired, which the Curator has no facilities for making, the passage should be marked and the symbol C with signature added. The copies will be made by the Museum copyist.

All letters are to be filed in the archives of the Museum, according to the specifications of the section relating to *Archives*, LXXVI. They will there be always readily accessible.

### LETTERS—REQUESTS FOR INFORMATION.

### XLIV.

Officers of the Museum will pay prompt attention to any requests for information which may be referred to them for action, it being considered an important part of the work of the Museum to attend to such matters fully, courteously, and promptly. The rule of the Smithsonian Institution that each day's mail shall be attended to on the day of its receipt, is to be followed in the Museum also.

### CONFERENCES AND COMMUNICATIONS.

### XLV.

The symbol C indicates that a personal conference is desired.

The Director will confer personally with the officers of the Museum in his office in the afternoon, or in his visits to the several departments.

Every communication on Museum business, whether it be an announcement or a request, should be made in the form of a written memorandum. The same should be done if any action is decided upon as the result of a conference. It is recommended that in communications between officers of the Museum, the stylograph be used, since this affords a means of preserving duplicate copies of the communication.

### XLVI.

### EXPLANATION OF SYMBOLS USED IN BUSINESS OF THE SMITHSONIAN INSTITUTION AND THE NATIONAL MUSEUM.

*Action to be taken.*

*L.* Library.
*M.* For files of the Museum.
*S.* For files of the Smithsonian Institution.
*F.* For files of the United States Fish Commission.
*A.* Answer.
*a.* Prepare answer.
*r.* To be read, and contents noted.
*C.* Personal conference desired.
*k.* To be kept until article announced arrives and to be then returned.

*t.* To be translated.

**. Confidential.

*r.* (As a second letter)—to be returned as soon as possible.

*f.* To be filed in general correspondence, or under special head designated.

The combination of two letters shows that double action is to be taken: as—*a. r.* Answer and return; *t. r.* Translate and return; *r. r.* Read and return; *S. f.* File in Smithsonian correspondence.

*Abbreviations for reference of letters, &c.*

| | |
|---|---|
| Baird, S. F | B. |
| Bean, T. H | Bn. |
| Boehmer, G. H | Br. |
| Brown, S. C | S. C. B. |
| Brown, S. G | S. G. B. |
| Brown, J. T | J. T. B. |
| Cushing, F. H | F. H. C. |
| Daingerfield, Miss | Dd. |
| Dall, W. H | Dl. |
| Dewey, F. P | Dy. |
| Flint, Dr | F. |
| Foreman, E | Fn. |
| Gass, Henry | G. |
| Goode, G. B | G. B. G. |
| Gill, Herbert A | H. G. |
| Griffin, Miss M. E | M. G. |
| Hawes, G. W | G. W. H. |
| Hobbs, George S | G. S. H. |
| Horan, Henry | H. H. |
| Leech, D | L. |
| Mason, O. T | Mn. |
| Powell, J. W | P. |
| Rhees, W. J | R. |
| Rau, C | C. R. |
| Ridgway, Robert | R. R. |
| Rathbun, Richard | R. Rn. |
| Smiley, C. W | C. S. |
| Stoerzer, Mrs. L | L. S. |
| Shindler, A. Z | A. Z. S. |
| Smillie, T. W | T. S. |
| Taylor, W. B | T. |
| Taylor, F. W | F. W. T. |
| True, F. W | Tr. |
| Turner, Miss J. A | J. T. |
| White, C. A | C. A. W. |

Assistants should always write their initials in the upper right-hand corner of the first page of letter which they have prepared for signatures.

### INK TO BE USED IN MUSEUM WORK.

### XLVII.

*Ink to be used in Museum work.*—Every officer of the Museum is required to have upon his desk two kinds of ink.

*a. Record ink*, in which all catalogue entries and other writings of permanent record are to be made. This must be a nutgall or carbon ink (not aniline).

*b. Copying ink*, in which all correspondence should be conducted.

### XLVIII.

### GENERAL RULES.

The exhibition halls are open to the public from 9 a. m. to 4.30 p. m. every day in the year, except Sundays.

### XLIX.

The business offices are open from 9 a. m. to 4 p. m.

### L.

The work-rooms and shops are open from 7.30 a. m. to 4.30 p. m.

### LI.

No smoking allowed in the public halls.

### ROUTINE ADMINISTRATION OF COLLECTIONS.

### LII.

*Routine administration of collections.*—The full routine for the administration of objects received in the Museum is as follows:

1. The package is received by the Registrar, who, if necessary to ascertain the nature of its contents, opens it, and if it contains objects belonging to several departments unpacks it and distributes its contents to the proper receptacles in the *sorting-room.*

2. The Registrar notifies the sender of the package that it has been received.

3. The Registrar enters the package in the Accession Record.

4. The Registrar writes upon an "Accession Card" the facts concerning the accession, and submits this card to the Director and Assistant Director, one of whom marks its assignment to one of the Museum departments.

5. The Registrar now sends the contents of the package or packages to the chief of the department to which assignment has been made, accompanied by the accession card and such other memoranda and letters as may help to complete its history.

6. The Curator examines and identifies the objects, writes upon the

accession card the entries necessary to complete the record for the "List of Accessions" and the "Historical File," and returns card and memoranda without delay to the Registrar.

7. The Curator enters the specimen or specimens in the Museum Catalogue belonging to his department.

8. The Curator marks each specimen indelibly with catalogue number, locality, and donor.

9. The Curator, after submitting the specimens, if necessary, to a preparator, assigns them places in the exhibition series, the study series, or the duplicate series.

10. The Curator also keeps a systematic or ledger record of the specimens, either upon catalogue-cards or upon the Museum register-sheets.

11. A letter of thanks, prepared under the direction of the Registrar, and signed by the Director, is sent to every person who has given specimens to the Museum.

## DEPARTMENT OF REGISTRY AND STORAGE.

### RECEPTION AND RECORD ROUTINE.

### LIII.

All packages coming by wagon to be received by the Transportation Clerk of Smithsonian Institution and entered in his record of transportation, for the purpose of checking the accounts of express companies and cartmen. Number of Transportation Record, prefixed by letter "T," to be marked upon them.

### LIV.

All packages of specimens coming through the hands of the Transportation Clerk, by messenger, mail, or in exchange boxes, to be delivered to the Registrar.

### LV.

Packages received in other buildings, of whatever nature, the property of the Museum, or intended for use in the Museum, must be reported by the person receiving them, who shall deliver full written memoranda to the Registrar before 4 p. m. on the day of receipt.

### LVI.

The Registrar shall enter all packages received, in serial order, in the Accession Record, and, when practicable, mark upon each its accession number, preceded by the letter A.

### LVII.

The Registrar may open any package of the nature of whose contents he is ignorant, and when it contains articles belonging to different departments shall unpack and assort them.

## LVIII.

The accessions of each day shall be arranged in serial order in the unpacking room, and the Registrar shall daily prepare a list of the accessions upon the blank "Accession Cards," which shall pass through the hands of the Assistant Director to the Director and be reclaimed from the Director's office by the Registrar; such additional facts as may be necessary to complete the record being written in.

## LIX.

The packages are to remain in the unpacking room until the "Accession Cards" have been returned. If special instructions concerning any package are needed they will be inscribed upon the cards. The packages may then be removed to the "Sorting Room."

## LX.

The sorting room is provided with closets with glass doors. One closet will be assigned to each department, and the Curator will be furnished with a key to its door. In assigning objects to the several departments, the schedule number of the department will be used as a symbol. The following additional symbols may be used:

S. I......Smithsonian Institution.
F. C.....Fish Commission.
P.........Private.
M.......Mistake—to be returned.
H........Hold without unpacking until further instruction.

Also, the symbols for the various deposits.

### SORTING AND DISTRIBUTION.

## LXI.

The Registrar, after sorting the objects into lots, may send them direct to their destination or may place them in the closets, subject to the order of the Curator to whom they are referred. When a package belongs to a single department it should not be unpacked by the Registrar.

## LXII.

Each accession lot or portion of accession lot sent out by the Registrar is to be accompanied by an accession card, upon which are written

(*a.*) The accession number.

(*b.*) Name and address of sender.

(*c.*) References to any explanatory letters or memoranda which may be on file. [When thought desirable, these may accompany the card.]

(*d.*) Any other facts not ascertainable from the specimens. The Registrar shall retain a duplicate of this card upon which is marked the name of the Curator to whom the accession lot is delivered.

### LXIII.

The Curator, after receiving an accession lot, shall, at his earliest convenience, and as a matter of urgent routine business (if possible the same day), fill up the accession card with the data necessary for the "Descriptive List of Accessions," and return it to the Registrar, who shall file it in the Card Catalogue of Accessions, the accompanying memoranda being placed in the Historical File, after the printer's copy for the list of accessions has been prepared. The Accession Cards for the current year are kept in a separate series and are not distributed in the General Card Catalogue until the yearly report has been prepared.

### LXIV.

When an accession lot is divided the general accession number is to be attached to each sub-lot, followed by the symbol of the department to which it is referred.

### LXV.

If the accession cards are not promptly returned the Registrar is to send a recall-memorandum.

## ANNOUNCEMENT AND ACKNOWLEDGMENT.

### LXVI.

The Registrar is to make the entries in the Announcement Record and to present on the first of each month a list of arrearages of announcements.

### LXVII.

When a package has been received the Registrar is to acknowledge the fact on the same day, by postal-card memorandum to sender.

### LXVIII.

The Registrar shall have prepared for the signature of the Director the formal letters in acknowledgment of gifts.

### LXIX.

Letters or postal-cards announcing shipment of packages are to be prepared by the Registrar.

## CONTRIBUTIONS AND THEIR ACKNOWLEDGMENT.

### LXX.

No money having at any time been specially appropriated for increasing the collections by purchase, the growth of the Museum has ever been and still is dependent solely upon the exertions of its officers and those of other branches of the public service, and upon the public spirit and liberality of its friends.

The friends of the Smithsonian Institution and the National Museum are earnestly invited to take part in the work of building up the collections, and, in particular, to respond to special requests for advice or other aid, which may reach them by letter.

The following rules for the acknowledgment of specimens will be adhered to:

1. Each contribution will be recognized by a formal written acknowledgment from the Director.

2. Each contribution will be announced in the annual reports of the Smithsonian Institution and the National Museum; and in the catalogues and other publications of these establishments, in which the objects contributed may be alluded to, the name of the contributor will always be given.

3. On the label, which is invariably attached to every object, the name of the contributor will be conspicuously printed. In the case of donations the form will be, "Gift of ——— ———," and where the objects have been obtained by special exertions of a friend of the Museum, who, however, is not their donor, the form will be, "Obtained by ——— ———," or "Collected by ——— ———."

4. Objects which may have been bought by special appropriations, such as those for the Philadelphia and Berlin exhibitions, will not be labeled with the name of the persons from whom purchased, except by special agreement in cases where these persons have been only in part paid for their exertions.

5. The Museum will make every possible return for aid rendered by offering in exchange its publications and its duplicate specimens.

### PACKING AND SHIPMENT.

### LXXI.

Packing will be done under the direction of the curators or in the packing room under the supervision of the Registrar, to whom objects to be packed may be sent with written memorandum of instructions.

Packing boxes may be obtained by requisition on the Registrar.

### LXXII.

Each package intended for shipment by express, freight, mail, or messenger, shall pass through the hands of the Registrar, and shall be accompanied by a memorandum, specifying its contents, and signed by the sender or packer. The Registrar shall make the proper entries in the Distribution Book.

### LXXIII.

The Registrar will have special instructions as to what classes of packages need the indorsement of the management of the Museum before they can be sent out of the building.

## LXXIV.

No Museum package is to be sent by the Transportation Clerk which has not been stamped with the proper cipher and marked with the words *Express*, *Fast Freight*, *Freight*, *Mail*, or *Messenger*.

### SHIPMENT OF PACKAGES TO THE MUSEUM.

## LXXV.

Packages of small size may be sent by express, charges to be collected on delivery, and larger packages by freight.

Packages may also be sent from points in the vicinity of military posts by addressing them to "*U. S. National Museum, care of Depot Quartermaster* (stating name of post)", the quartermaster having instructions to forward all such packages.

On the Pacific slope, packages may also be sent in care of the Alaska Commercial Company, San Francisco.

Foreign packages intended for the Museum may be sent by mail, addressed to the Smithsonian Institution, Washington, D. C., or, if of large size, through the following agents of the Smithsonian Institution:

Algeria: Commission Française des Échanges Internationaux, Paris.
Australia: See New South Wales, New Zealand, Queensland, South Australia, Tasmania, and Victoria.
Austria-Hungary: Dr. Felix Flügel, 49 Sidonien Strasse, Leipzig.
Belgium: Commission Belge d'Échange Internationaux, Brussels.
Brazil: Instituto Historico, Geographico y Ethnographico, Rio Janeiro.
Chile: Universidad, Santiago.
China: U. S. Consul-General, Shanghai.
Cuba: Prof. F. Poey (R. University), Havana.
Denmark: Kongelige Danske Videnskabernes Selskab, Copenhagen.
France: Commission Française des Échanges Internationaux, Paris.
Germany: Dr. Felix Flügel, 49 Sidonien Strasse, Leipzig.
Great Britain: William Wesley, 28 Essex street, Strand, London.
Greece: By mail direct.
Hayti: Sécrétaire de l'Etat des Relations Extérieures, Port-au-Prince.
Holland: See Netherlands.
India: William Wesley, London.
Italy: Biblioteca Nazionale Vittorio Emanuele, Rome.
Java: Genootschap van Kunsten en Wetenschappen, Batavia.
Mauritius: William Wesley, London.
Mexico: Museo Nacional, Mexico.
Netherlands: Bureau Scientifique, Professor von Baumhauer, Harlem.
New South Wales: Royal Society of New South Wales, Sydney.
New Zealand: Parliamentary Library, Wellington.
Norway: Kongelige Norske Frederiks Universitet, Christiania.
Portugal: Escola Polytechnica, Lisbon.
Queensland: Government Meteorological Observatory, Brisbane.
Russia: Commission Russe des Échanges Internationaux, St. Petersburg.
South Australia: Astronomical Observatory, Adelaide.
Spain: Real Academia de Ciencias, Madrid.
Sweden: Kongliga Svenska Vetenskaps Akademien, Stockholm.
Switzerland: Bundes Canzlei, Berne.
Syria: By mail direct.
Tasmania: Royal Society of Tasmania, Hobarton.
Turkey: By mail direct.
Venezuela: Universidad [Dr. A. Ernst], Caracas.
Victoria: Public Library, Melbourne.
West Indies: By mail direct.

If sent from seaport towns by vessel to New York, packages may be directed to Smithsonian Institution, care of Collector of Customs, port of New York.

## DEPOSITORIES AND STORE-ROOMS.

### LXXVI.

The classification and designation of the several depositories and storage rooms has already been detailed. The assignment of material to these deposits is as follows:

The *Library* (DA) shall contain all printed books and papers.

*Librarian.*

The *Archive Room* (DB) shall contain all manuscripts, books, and papers relating to the history of the Museum and its contents.

*Assistant Director.*

The *Label Room* (DC) shall be the depository for labels and blanks, and may be used as a work-room for labeling and cataloguing.

*Registrar.*

The *Sample Deposit* (DD) shall receive samples of all kinds of articles used in the museum, drawings and specifications, and dealers' price-lists and circulars.

*Assistant Director.*

The *Supply Deposit* (DE) contains curator's supplies of all kinds, needful for mounting and preservation; stands, label-holders, &c.

*Registrar.*

The *Bottle Deposits* No. 1 (DF), in Smithsonian building, and No. 2 (DG), in Museum building, shall contain bottles.

*Superintendents.*

The *Alcohol Deposit* (DH) shall contain alcohol on tap.

*Curator of Ichthyology.*

The *Superintendent's Deposit* (DI) shall contain supplies for mechanics and laborers.

*Superintendent.*

The *Duplicate Deposit* (DK) is the receptacle for duplicate specimens awaiting distribution.

*Registrar.*

The *Modeler's Deposit* (DL) contains molds and unfinished casts.

*Modeler.*

The *Temporary Storage* (DM) is a deposit for packages pending administration.

*Registrar.*

The *General Storage* (DN) is the receptacle for packages set aside, pending administration, for a considerable time.

*Registrar.*

The *Private Storage* (DO) is a deposit for the private effects of officers of the Museum.

*Registrar.*

The *Stati nery Deposit* (DP) is a supply deposit for articles of stationery.

*Stationery Clerk.*

## LXXVII.

The officer in charge of a storage-room shall deliver packages only upon written order from the management of the Museum or in accordance with regular routine of administration.

## LXXVIII.

A record book is provided for articles assigned to general or private storage.

## LXXIX.

Effects belonging to persons not officers of the Museum may be placed in or removed from private storage only upon written order from the Director or Assistant Director.

## DEPARTMENT OF ARCHIVES.

### CLASSIFICATION OF ARCHIVES.

## LXXX.

The Archives of the Museum shall consist of the following classes of papers, printed and manuscript, to wit:

1. *The Announcement Record.*—The manuscript volumes, in which have been entered all announcements of objects forwarded to the Museum, and promises to send contributions in future.
2. *The Accession Record.*—Consisting of (*a*) the manuscript volumes (*Accession Books*) in which all accessions to the Museum are entered from day to day, in order of their reception, and (*b*) the card catalogue (Card Catalogue of Accessions), in which the same record is kept, arranged alphabetically under names of senders.
3. *The Record of Applications.*—The manuscript volumes in which are entered, in order of reception, all applications for specimens or other scientific material, either as gifts or loans, all proposals for exchange, &c.
4. *The Distribution Record.*—The manuscript volumes in which are entered all lots of scientific material sent away, either as gifts, loans, or exchanges.
5. *The Specimen Registers.*—Consisting of (*a*) the manuscript volumes—"Museum Catalogues"—in which the individual specimens belonging to the several sections of the Museum have been entered by the Curators of the sections under serial numbers, corresponding to those which have been indelibly marked upon the specimens themselves, and (*b*) the "Museum Register," which is kept in separate series, one in each sec-

tion of the Museum, by means of which, either (1) on catalogue cards, (2) on specially printed forms, or (3) in blank record books, arranged after the manner of a bookkeeper's ledger, a record in systematic order of the specimens is kept.

6. *The Historical File.*—Consisting of all papers, manuscript and printed, relating to the history or description of specimens or other scientific material received in the Museum—particularly letters and catalogues which may accompany any specimens or lots of specimens at the time of their reception. This file is accessory to and illustrative of the *Accession Record*, No. 2.

7. *The Application and Proposal File.*—This file is made up of all letters and other papers relating to applications, such as are entered in the Record of Applications (No. 3), and particularly lists of desiderata submitted by correspondents, and lists of duplicates in collections of correspondents, sent for use in exchange or purchase. Here also may be filed unaccepted proposals for furnishing supplies, furniture, &c., arranged, however, in a separate series.

8. *The Distribution File.*—Made up of check-lists and memoranda relating to material sent out. When an application has been fully complied with and is canceled, the papers relating thereto to be transferred from 7 to 8 and arranged with those relating to the sending of objects in response to said application.

9. *Correspondence Files.*—This to consist of (1) indexed copy-book record of letters written on Museum business, and (2) alphabetico-chronological files of letters received in connection with same.

10. *Administration Files.*—Consisting of the papers relating to the internal administration of the Museum, reports, requisitions, orders, bills, plans, contracts, registers of visitors, &c., &c.

11. *Publications relating to work of Museum, or founded upon material which is its property.*—This series of papers should be complete, arranged with special reference to convenience of consultation.

## LXXXI.

*Management of Announcement Record.*—The *Announcement Record* shall be kept by the *Registrar*, to whom all memoranda and letters relating to specimens or other objects announced or promised are to be given. After entering in the Announcement Book such facts as may be called for by the printed heads to the columns, these letters, &c. are to be marked with the current number of the announcement and returned, filed in serial order, until the object is received. A monthly statement of arrearages is to be furnished by the Registrar.

## LXXXII.

*Management of Accession Record.*—The *Accession Record* shall also be kept by the Registrar, who shall enter all accessions in serial order, marking each package with its current number, prefixed by the letter "A," at the same time marking in the same manner any papers which may accompany it.

A new volume of the *Accession Book* shall be opened with the beginning of each year. The current volume shall be kept in the office of the Registrar, the back volumes in the Archive Room.

The *Card Catalogue of Accessions* is also to be kept up by the Registrar, each accession being described in writing upon the proper card, and these cards to be arranged alphabetically to serve as an index to the *Accession Book.* As soon as the list of accessions for a full year has been printed, the cards for that year shall be intercalated in their proper places in the general *Card Catalogue,* which is a complete alphabetical record of accessions from foundation of Museum to beginning of each current year.

The Catalogue for the current year is to be kept in the office of the Registrar, the General Catalogue in the Archive Room.

The current card-catalogues, as added to and amended by the curators to whom the cards are to be submitted in accordance with Rule LXIII, will serve as copy for printing the annual or other lists of accessions.

## LXXXIII.

*Management of Record of Applications.*—The *Record of Applications* shall be kept in the office of the Assistant Director. An alphabetical index to the same will be supplied by the packets in the *Application and Proposal File.*

## LXXXIV.

*Management of Distribution Record.*—The *Distribution Record* shall be kept by the Registrar, through whose hands, in accordance with Rule LXXII, all packages intended for shipment, and who shall retain and file as a voucher in the *Distribution File* the written orders in accordance with which each package is sent out.

An alphabetical index to the Distribution Record, in so far as it relates to collections distributed, will be supplied by the packets in the *Distribution File,* which is to be kept in the office of the Registrar.

## LXXXV.

*Management of the Specimen Register.*—The *Museum Catalogues* and the *Museum Registers* belonging to each section shall be under the charge of the Curator or Acting Curator of the section, whose duty it shall be to enter, at the earliest opportunity, each specimen assigned to his department, giving it a provisional name, assigning to it a current number, which, together with name of sender and locality, are to be marked indelibly upon or permanently affixed to the specimen.

With each object or collection the Curator will receive from the Registrar a card, upon which is entered the history, so far as may be known to him, and accompanied by such papers as may belong therewith. Upon this card the Curator is expected to inscribe a concise description of the accession lot, *returning the card and accompanying* papers *as soon as possible to the Registrar*, in order that the Accession Record and the Historical File may be completed and the descriptive list of accessions prepared for the printer. When a letter is sent to the sender of a specimen, giving an account of the object, a copy of this should be made by manifold process (stylograph) or upon a leaf of a letter-book, and this copy should be sent to the Registrar.

## LXXXVI.

*Management of Historical File.*—The *Historical File*, in which all papers relating to the history of objects in the Museum are to be arranged, shall be under the charge of the Registrar, in whose room shall be kept the part belonging to the current year, the main file being arranged in the office of the Assistant Director, or in the Archive Room, as may prove most convenient.

In this file should be preserved all letters (or copies of them) which relate to objects preserved in the Museum. [If necessary, index slips referring to these may be prepared, to be arranged with the files of the Smithsonian Institution.] Applications for publications should be copied on the proper blank form.

Each accession shall, if accompanied by papers, have assigned to it an envelope, in which all such papers shall be ultimately arranged. On the outside of this envelope shall be entered the *current number of the accession*, the *name of the sender*, and the *date of the accession.*

These packets to be filed serially, in order of accession numbers, in locked cases. An alphabetical catalogue to the same is supplied by the card *Catalogue of Accessions.*

Any packet or letter may be taken out for temporary use by presentation of an application slip on which the name of the applicant is signed. This slip is to be filed in place of the removed packet. Packets or letters may not be retained more than four weeks. If any paper is needed for permanent retention, a copy of it will be furnished upon application.

Only Curators or Acting Curators may be permitted to withdraw packets from the historical file.

## LXXXVII.

*Management of the Application and Proposal File.*—The make-up of the Application and Proposal File has already been defined (Rule LXXX). This file, like the *Record of Applications*, to which it serves as an alphabetical index, shall be kept in the office of the Assistant Director. The papers of this file are to be enveloped and docketed like those in the *Historical File.*

## LXXXVIII.

*Management of the Distribution File.*—The Distribution File is to be kept in the office of the Registrar. Every package sent out shall have assigned to it an envelope, upon which the address, date of sending, and nature of object sent shall be marked. These shall be arranged alphabetically, to serve as alphabetical index to *Record of Distribution.* Complete invoices of every sending consisting of more than one object shall be filed here, and the packets in this file may be removed only by order of Director or Assistant Director.

In this file, with the other papers relating the distributions, shall be kept applications which have been filled.

## LXXXIX.

*Management of Correspondence File.*—The Copy-Book Record of letters signed by the Director of the Museum shall be kept by the Corresponding Clerk of the Smithsonian Institution. In the file-room of the Smithsonian Institution shall be kept all letters not relating directly to the administration of the Museum or the history of the collections.

The Assistant Director shall keep the required record of his correspondence by copy-book and letter file, and in his letter-file may be placed letters received by the Director or other officers of the Museum relating to the actual administration of the Museum.

Curators of sections are expected to keep copy-book records of letters written by them on Museum business, the same to be at any time open to the inspection of the authorities of the Museum, and to hand in for filing in the *Historical File* letters relating to history of specimens, and in the *Correspondence Division* of the *Administration Files* letters relating to general administration which they may receive.

## XC.

*Management of Administration Files.*—The *Administration Files* shall be arranged in the most convenient manner in the office of the Assistant Director, who will, when desired, aid other officers of the Museum in consulting their contents. These files shall contain:

Reports of officers of the Museum.

Reports of collectors working for the Museum.

All records or memoranda which have been kept in the past by officers of the Museum.

Plans and specifications for cases, bottles, and all kinds of Museum supplies.

Samples of labels, stationery, blanks, bottles, locks, &c., &c., including all kinds of Museum supplies.

Contracts and proposals.

Catalogues, plans, &c., illustrating work of other museums.

Circulars and price-lists of tradesmen and manufacturers.

## DEPARTMENT OF LIBRARY.

### OBJECTS AND SCOPE OF THE LIBRARY.

### XCI.

For the convenience of the scientific staff of the Museum, a working library has been established, in which will be kept such works as are necessary for constant reference in the classification and study of the collections, and in the work of publication. In this library shall be kept all books, pamphlets, journals, maps, &c., and such of the archives of the Museum as may be there assigned.

### CENTRAL AND SECTIONAL LIBRARIES.

### XCII.

In the Central Library shall be retained all books treating of more than one subject, such as periodicals, proceedings of societies, serial reports, dictionaries, and cyclopedias, together with such monographs as are not desired in the Sectional Libraries. To each Sectional-Library which may be formed, only those works may be assigned which relate directly to the work of that section only. Books in Sectional Libraries shall be considered to be personally loaned to the Curators in charge.

### ENTRIES OF BOOKS, ETC.

### XCIII.

All books and other matter shall first be entered at the Central Library, and the necessary acknowledgments made, after which monographic works, upon application, may be sent to the Sectional Libraries, their assignment being designated upon the card catalogue.

### LIMITATIONS TO THE USE OF THE LIBRARY.

### XCIV.

No person who is not a member of the scientific staff of the Museum shall withdraw books or other matter, without special written permission from the Director of the Museum. Persons taking books from the Central Library shall be responsible for the safe-keeping of the same, and shall make good any losses. They shall not be allowed to withdraw other books until those which may have been lost are restored. No one is expected to retain books longer than two weeks, unless they are in actual use. Certain works of reference may be designated, which shall upon no account be taken from the Library. All books and other matter shall be at all times subject to recall by the Librarian.

### ISSUE OF BOOKS.

### XCV.

No book shall be withdrawn from the Central Library until the applicant has filled out and signed the prescribed blank form of application or call-card. Supplies of call-cards may be obtained from the Librarian or the Registrar.

### REGULATION OF SECTIONAL LIBRARIES.

### XCVI.

Each Sectional Library shall be under the control of a Curator or Acting Curator, who shall be responsible for its safe-keeping, and who shall on no account lend the books. Books in a Sectional Library must be returned to the Central Library before they can be issued for use outside of the room to which they are accredited. The books of each Library shall be kept separate from all other books in suitable cases in the rooms of the Curator, the locks of which shall be controlled by a master-key in the hands of the Librarian, who may at any time examine them, and call the attention of the Curators to any deficiencies.

### DUTIES OF THE LIBRARIAN.

### XCVII.

The Librarian of the Museum shall be responsible for all books, pamphlets, and periodicals belonging to the Museum, and for such of the archives as may be assigned to his care.

## DEPARTMENT OF PUBLICATIONS.

### XCVIII.

*Description of Publications.*—The Publications of the United States National Museum consist of two series, the Bulletins of the United States National Museum, and the Proceedings of the United States National Museum. These are published under the direction of the Secretary of the Interior, to whom application should be made by those who desire to obtain them.

### XCIX.

*Rules for Administration of the Publications.*—Articles intended for publication in the Proceedings of the National Museum or Bulletin of the Fish Commission must be submitted to the Director for approval.

After approval, all papers are to be given to the Editor of Proceedings and Bulletin, who will record the titles, number of pages of manuscript, number and character of illustrations, date of receiving them, giving each article a number by which it may be subsequently referred to whenever necessary. If a paper is to have illustrations, the manuscript will not be sent to the printer until the blocks are ready to accompany it.

The Editor will forward original drawings to the engraver, receive and take charge of the blocks, and, after recording, numbering, and plainly marking the blocks, so that their place may be easily determined, he will send them to the printer. Original drawings not in actual use will be kept by the Editor and filed, so as to facilitate future reference. Plates not in use will be placed in charge of the Smithsonian Institution.

Proofs of all papers will be sent by the Public Printer to the Director, who will transfer them to the Editor for distribution to the authors to whom they belong. Each author will be responsible for the proper correction of proofs of his papers and for their return to the Editor.

Applications for extras, stating the number desired, must be made to the Director when the manuscripts are presented for approval.

The Editor will attend to the general management of the volumes, arranging title pages, prefaces, heads, numbering plates, &c., &c. He will assign a card to each article, on which will be given the serial number, copy of title, number of manuscript pages, character of illustrations, date of receipt, date of sending drawings to engraver, time of sending blocks to printer, and the various stages of progress of proofs.

## C.

*Printed List of Accessions.*—A list of the accessions to the Museum will be printed from time to time, and at the end of the year incorporated in the annual report. In connection with the list will be printed the memoranda relating to the history of each accession list, which may be worthy of presentation. This list will be prepared by the Assistant Director and Registrar, aided by the several curators.

To secure promptness and accuracy in this work it is important that the accession cards, sent with each accession list to the curator to whom it is assigned, should be filled out and returned with all possible expedition. This work should be the first and most important in the routine of each day. Otherwise the records of the Museum will be imperfect.

## CI.

*Publication Storage.*—The publications, stereotype plates, and woodcuts, property of the Museum, will be administered upon under the rules of the Smithsonian Institution, and under the direction of its Chief Clerk.

## CII.

*List of the publications.*—A list of the publications is given in Circular No. 12, and also in the Catalogue of Publications of the Smithsonian Institution; both Proceedings and Bulletin being reproduced in the Smithsonian Miscellaneous Collections.

## DEPARTMENT OF DUPLICATES AND EXCHANGES.

### CIII.

*Application for Duplicates and their Distribution.*—Applications for duplicate specimens must be made in writing, and when from domestic institutions, should be indorsed by a member of Congress. These must be approved by the Director, and after the assignment has been made, and the specimens selected, the Curator or the Registrar will attend to packing and the latter to shipment, send invoices, make the record, and attend to the necessary correspondence.

The list of applications for duplicates is provided for in the regulations of the Department of Archives.

## DEPARTMENT OF SUPPLIES.

### CIV.

*Purchase of Supplies.*—Supplies for the Museum may be obtained by a written order to the dealer or manufacturer, signed by the Director, Assistant Director, or Chief Clerk of the Smithsonian Institution, or upon indorsement of requisition by an order from the order-book, issued by the Superintendent of the Buildings. The Museum will not be responsible for the payment of bills contracted without such written order, which must be filed with the bill, if not proven paid.

Orders to the amount of over $100 may not be made without a written agreement with, or offer from, the person from whom it is ordered.

### CV.

*Issue of Orders.*—Orders for miscellaneous supplies, such as tools and material for use by mechanics and laborers, shall be issued by the Superintendent upon the proper blanks.

The Superintendent may also issue orders for other articles, under the instructions of the Management of the Museum. No bills shall be paid unless accompanied by the official order. Bills accompanied by orders are to be examined by the Superintendent.

### CVI.

*Storage of Supplies.*—Supplies shall be stored in one of the several "depositories" provided for their reception.

### CVII.

*Requisitions.*—The Assistant Director will take action on requisitions for—

Assignment of rooms or space in exhibition halls.

The use of furniture or exhibition cases.

The services of preparators, clerks, or copyists.

The purchase of supplies.

The Registrar will act on requisitions for blanks and circulars, packing, and shipment.

The Stationery Clerk will supply articles from the stationery room on indorsement of Chiefs of Departments, a list of whom will be posted in the stationery room.

The Superintendent of Buildings will act on requisitions for—

Repairs.

Cleaning.

Services of laborers.

Regular articles of Museum supply.

## CVIII.

*Issue of Supplies and Assignment of Laborers.*—Officers of the Museum requiring supplies or the use of furniture, or other property of the Museum in the custody of the Superintendent, may obtain them by filing a requisition with that official.

If the article needed is not in stock, or of a kind not ordinarily kept in stock, the requisition must be indorsed by the Director or Assistant Director.

Requisitions must be countersigned by the chief of the special department of the Museum from which they emanate.

The Property Record shall show, under each number, the final disposition of each article.

The Superintendent shall keep an account with each Chief of Department, debiting him with property delivered to him, and crediting him with its return. Certificates of expenditures may cancel debits in this book.

Requisitions for labor or other service shall be made in a similar manner, and a book shall be kept in which each Chief of Department shall be charged with labor assigned to him.

## CIX.

*Preservation of Supplies—Inspection.*—The Superintendent shall have charge of and be responsible for the buildings and property not otherwise assigned.

He shall make a monthly examination of all furniture and fixtures, water and gas pipes, locks, window-fastenings, roofs and gutters, plugs and stop-cocks, hose, sinks, urinals, washstands and water-closets, and shall attend to the necessary repairs of the same, reporting result of inspection and his action in the premises in writing to the Assistant Director.

## CX.

*Property Record.*—The Superintendent shall receive and, when desired, receipt for every piece of furniture, implement, or article of supplies, and shall catalogue every movable article in the Property Record, marking it indelibly with its entry-number and the words "U. S. National Museum."

## CXI.

*Inventory.*—The Superintendent shall make a semi-annual inventory of property (during the months of December and May), making a report to the Management upon articles destroyed, expended, or sent away.

## CXII.

*Disposal of Condemned Property.*—All property unfit for use, such as broken furniture, waste paper and metal, packing-boxes, &c., shall be delivered to the Superintendent to be disposed of under instructions from the Management of the Museum.

## CXIII.

*Property removed.*—The Superintendent shall be responsible for and take receipts for all property leaving the Museum building, for specimens removed, except under the orders of the *Registrar*, and shall allow nothing to be removed except by written permit signed by proper authority.

## CXIV.

*Jars and Bottles.*—Jars and bottles may be obtained by requisition upon the Superintendent. When possible, if large quantities of any given kind are to be needed, this requisition should be made in advance. Requisitions should be made in accordance with schedule symbols upon diagrams, copies of which may be obtained from the Registrar.

## CXV.

*Alcohol and Preservatives.*—Alcohol is stored in fire-proof vaults under the charge of the Curator of Ichthhology. Supplies are obtained by requisition upon that officer. On no account shall alcohol be issued except for use in preserving or poisoning specimens or in the work-rooms of preparators.

Other preservatives are kept in the same custody.

## CXVI.

*Exhibition Cases.*—The cases of the Museum may be designated as follows:

*Approved Patterns.*

| Symbol. | Name. | Dimensions. |
|---|---|---|
| Case A (4.4) | Pier uprights | 8.6×4.4×9 |
| A (3.3) | Pier uprights | 8.6×3.3×9. — |
| B (4.4) | Floor uprights | 8.6×4.4×7. |
| B (3.3) | Floor uprights | 8.6×3.3×7. |

| Symbol. | Name. | Dimensions. |
|---|---|---|
| C (1.3) | Door screens | 8.6×1.3×7. |
| C (2.2) | Door screens | 8.6×2.2×7. |
| D (1.3) | Sliding screens | 8.6×1.3×7. |
| D (2.2) | Sliding screens | 8.6×2.2×7. |
| E | Flat screens | |
| F ½ | Fold screens, half pillar | |
| F | Fold screens, whole pillar | |
| G | Slope screens | |
| H | Table uprights | |
| I | Unit tables | |
| J J/2 J/4 | Unit drawers | |
| K | Unit boxes | |
| L | Wall uprights | |
| M | Salvin bird-cases | |
| N | Gothic alcoves | |
| O | Basement drawer-storages | |
| P | Sectional library cases | |
| Q | Standard shelf-stacks | |
| R | Standard pigeon-hole stacks | |
| S | Quarter tables | |

*Appliances.*—(*Special.*)

Gavit side brackets.
Gavit side racks.
Gavit front brackets.
Gavit front racks.
Jenks rack locks (with or without Yale lock).
Jenks link locks.
Segment hinges (for fold screens.)
Unit box clips.

Drawings and samples of cases and appliances may be found in the office of the Assistant Director.

## CXVII.

*Blanks.*—The following blanks, intended for the use of officers and employees, may be obtained by requisition upon the Registrar:

Museum Catalogues.

Invoice Sheets (for collectors). Museum Register Sheets. Property Record.

Library Catalogue Cards.
Library Call Cards.
Museum Catalogue Cards.
"Memorandum" pads.
"Order for work" pads.
"Shipment Memorandum" pads.
"Requisition for Supplies" pads.
Preparator's Record.
Preparator's Memorandum.
Stylograph Books.
Monthly Report blank.

## DEPARTMENT OF ACCOUNTS.

### CXVIII.

*Preparation of Vouchers and Disbursements.*—All accounts will be administered under the direction of the Chief Clerk of the Smithsonian Institution, and all payments made from his office.

The Museum will not be responsible for the payment of any bills contracted without a written order from the Director or Assistant Director or Chief Clerk of the Smithsonian Institution.

Orders are to be returned by the party furnishing the article required, with the cost stated, and the receipt of the person to whom it was delivered.

Bills presented are to be examined by the Accountant, to see that the calculations are correct and the voucher in proper form, prices reasonable, and the articles delivered.

The payment of bills is to be made between the twenty-fifth and the last day of each month, and of salaries on the last day of the month.

Cash from sales of old material, publications, postage-stamps, &c., to be deposited with the Accountant.

The amount required to pay bills in foreign countries is to be ascertained by the Accountant, and the statement of the bank as to cost to be kept with the voucher.

A statement is to be made to the Drector monthly of the receipts and expenditures, and of all contracts and agreements involving expenditure.

### CXIX.

*Certification and Approval of Accounts.*—Accounts must be certified to by the Assistant Director or other officer designated by the Director, and must be approved by the Director or Secretary of the Smithsonian Institution.

### CXX.

#### INSTRUCTIONS FOR MAKING OUT ACCOUNTS.

1. Vouchers must be signed in ink, and by the person in whose name the account is made—not "per" any agent or clerk—and the amount expressed both in writing and figures.

2. The signature should be at the bottom of the page, and should correspond with the name of the individual or company, at the head of the account. Signature by *agent* will not answer; *it must be by the principal.* Nothing should be written on the blanks excepting the signature. Any vacant spaces will be filled up in this office when payment is made.

3. Evidence of authority to sign vouchers for incorporated or unincorporated companies must accompany accounts. Such evidence should be in the form of an extract from the by-laws or records of the company or association, showing the authority of the officer to receive and receipt for moneys for the company, and giving his name and the date of his election and appointment, which extract must be verified by a certifi-

cate, under seal, signed by the president or secretary, or by one of these officers, and not fewer than two of the directors, which certificate must state that such authority remains unrevoked and unchanged.

If the company have no seal, the extract should be certified as correct by a notary public or other competent officer under his seal.

4. Signatures by mark must be witnessed. If John Smith has a bill and he is unable to write his name, it should be written for him, and then he should place his mark—thus: John $\overset{\text{his}}{\underset{\text{mark.}}{+}}$ Smith. Witness: David O'Neill.

5. Accounts for traveling expenses should give the places of departure and destination, supported by sub-vouchers, such as hotel bills, &c. Each day's expenses should be mentioned under its date.[*]

6. Hotel bills should give the dates of arrival and departure and the rate per day. Thus a person arriving before breakfast June 20, and leaving after dinner June 24, will have been at the hotel four and a half days, which, at $3 per day, would amount to $13.50, and should so express it in the account.

7. Vouchers for supplies must be in detail, showing the nature, quantities, and *rates*, as well as the amount, namely: 5 pounds nails, at 5 cents, 25 cents.

8. Accounts for service must give the dates, stating whether inclusive or not, between which such service was performed, and the rate of pay, thus: A man employed from June 28 to July 10, inclusive, would have served 13 days, which, at $1.50 per day, would amount to $19.50.

9. Accounts involving sub-vouchers, some or all of which, for good reasons, cannot be furnished, must be signed by the party, and affidavit made before a notary public or justice of the peace that the account in question is correct.

The seal of the officer before whom an account is sworn should be affixed.

## DEPARTMENT OF BUILDINGS AND LABOR.

### CXXI.

*Duties of Superintendent.*—The Superintendent of Buildings shall be responsible for the policing of the buildings and the conduct of the mechanics and laborers.

*Laborers and Mechanics.*—He shall direct the work of all mechanics, laborers, messengers, and other employees of the Museum, and shall keep a *time-book*, in which shall be recorded their time of service, the nature of the work performed, and the rate of pay, reporting to the *disbursing officer* monthly, or at the close of the service of any individual.

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[*] To this must be added the following certificate: "This account is correct and just, and the items of expenses are verified from memoranda kept by myself, and no part of said travel was under a pass."

*Details of Workmen.*—Workmen may be detailed by him for special service upon the presentation of proper *requisitions.*

*Lost and Found Record.*—He shall keep a "Lost and Found Record," and attend to the identification of claimants and the restoration of articles found in the Museum.

*Tools.*—He may issue tools to workmen, holding them responsible for their safe return.

### CXXII.

*Duties of Assistant Superintendents.*—The Superintendent shall have two assistants—one in each building. The assistant in the Museum building shall have especial charge of records and the property storage, and in the absence of the Superintendent perform his duties. The assistant in the Smithsonian building shall have charge of that building and the property it contains, and shall report all needful action to the Superintendent. The assistants may not deviate from routine except by special order.

### CXXIII.

*Duties of Electrician.*—The Electrician shall inspect and keep in proper running order all telephones, burglar-alarms, electric clocks, watch-clocks, and other electric apparatus generally, and such other as may be placed in his charge.

### CXXIV.

*Duties of Engineer.*—The Engineer shall have charge of all boilers, heating-apparatus, water-pipes, and gas-pipes, making weekly inspections and keeping them in repair; he shall be responsible for their working; he shall inspect monthly and record the readings of all gas-meters; he shall attend to the inspection, reception, and storage of wood and coal, under the direction of the Superintendent, and shall report deficiencies at least a week in advance; he shall attend to the removal of ashes, giving to the cartmen the regulation tickets, one for each load, which they present to the Superintendent in claiming payment; he shall make repairs of locks, water and gas fixtures, &c., as may be ordered by the Superintendent.

### CXXV.

*Duties of Assistant Engineer.*—An Assistant Engineer shall have charge of and be responsible for the heating apparatus in the Smithsonian building, under the supervision of the Engineer.

### CXXVI.

*Duties of Firemen.*—The Firemen work under the direction of the Engineer, and one of them shall, when necessary, serve as blacksmith.

## CXXVII.

*Duties of Carpenter.*—The Carpenter shall work under the direction of the Superintendent. Extra carpenters may be employed by the Superintendent when so instructed.

## CXXVIII.

*Duties of Inspectors.*—The Inspectors shall have their beats assigned them by the Superintendent. They shall be responsible for the safety of property within their beats, and shall report cases of damage; they shall see that the Museum rules relating to visitors are enforced, preventing smoking and disorderly conduct and reporting irregularities; they shall deliver all articles found in the Museum to the Superintendent's office.

The Inspectors shall answer the questions of visitors and serve as guides as far as possible without conflict with other duties and without leaving their beats.

They shall receive no fees, under penalty of discharge.

The Inspectors constitute the *first watch*, and shall continue on duty till relieved by the *second watch.*

## CXXIX.

*Duties of Watchmen.*—The Watchmen shall be responsible for all property under their care. When going upon duty they shall (1) examine all doors and windows; (2) satisfy themselves that there are no strangers in the building; (3) see that the *fire-plugs* are in order for use.

They shall visit each record station every hour and make the proper record with the clock; any failures to do this must be strictly accounted for. When relieved, the Watchman is to report to the next watch any irregularities or suspicious circumstances he may have observed.

All signals and telephone calls to be answered without delay, and emergencies to be announced by the code signals.

Watchmen shall remain upon duty until regularly relieved. The Watchmen who admit the workmen shall keep their time-record.

## CXXX.

*Duties of Janitors.*—Janitors stationed at the public entrances shall be in their places at the sound of the signal for opening, and shall not leave during the hours of exhibition. They shall refuse admission to disorderly persons and children without guardians. Canes, umbrellas, parasols, baskets, and bundles shall be retained at the door and checks given for the same. No bundles shall be taken from the building without properly signed permits, which must be filed. No fees shall be received under penalty of discharge. Dogs shall be excluded by the janitor.

The Janitors shall record daily the readings of the automatic enumerators.

Janitors stationed at the entrance to offices shall answer questions and prevent intrusions.

### CXXXI.

*Duties of Messengers.*—Dispatch messengers shall report at the Superintendent's office, and may be summoned by signal.

Office Messengers shall be sent away from the buildings only upon special service.

### CXXXII.

*Duties of Cleaners.*—Cleaners shall have their work assigned them by the Superintendent. The work shall be done before 9 a. m.

### CXXXIII.

*Duties of Laborers.*—Laborers shall work under the direction of the Superintendent or other officers who make requisition for their services. They shall report, when out of work, to the Superintendent or his assistants.

### CXXXIV.

*Outside Workmen.*—Mechanics and laborers employed by the day shall report each day at the Superintendent's office, before beginning and after ending work, otherwise their claims for payment may be disallowed.

### CXXXV.

*Hours of Work.*—Workmen, unless otherwise ordered, serve from 7.30 a. m. to 4.30 p. m.

Janitors serve from 8.30 a. m. to 5 p. m.

Watchmen and inspectors serve according to special schedule.

Outside workmen serve according to agreement.

Workmen report to watchmen on duty at entrance door.

### CXXXVI.

*Opening and Closing Museum.*—The hours of opening and closing the Museum, and the beginning and end of noon recess, will be announced by signal from Superintendent's office.

The outer doors of the Smithsonian and Museum buildings must be locked at the time of their closing to the general public, and no one allowed to enter by means of pass-keys. A watchman will be in attendance to open the doors when summoned.

### CXXXVII.

*General Rules.*—The following general rules will be enforced by the Superintendent:

The exhibition halls are open to the public from 9 a. m. to 4.30 p. m. every day in the year, except Sundays.

The doors shall be permanently closed at 5 p. m.

The business offices are open from 9 a. m. to 4 p. m.

The work-rooms and shops are open from 7.30 a. m. to 4.30 p. m.

No smoking will be allowed in the public halls.

No dogs will be admitted to the exhibition halls.

Canes and packages will be deposited with the janitor.

Employees of the Museum are forbidden under penalty of discharge to receive fees from visitors.

## CXXXVIII.

*Access to the Building after Office Hours.*—After the buildings are closed in the afternoon, and until the hour of opening, the watchmen are forbidden, under penalty of dismissal, to allow to remain, or to enter, any persons whose names are not upon the lists furnished them, or who are not provided with a properly certified pass. This rule applies to Sundays and other days when the Museum is closed. No exceptions can be made in favor of friends of the watchmen.

The main entrance of the Museum building will be kept closed except during hours of public admission, and access to the building can be gained only by ringing the bell at the entrance to the Northwest pavilion. Every person admitted to the building, when closed, shall register his name upon a special record kept for the purpose, and the watchman is required to note opposite his name the hours of his admission and departure. When a person whose name is on the list is accompanied by a friend, he must sign his own name underneath that of his friend preceded by the words "Introduced by."

## CXXXIX.

*Removal of Property.*—No Museum property shall be removed from the buildings except upon the presentation of a written order signed by the Director of the Museum, the Assistant Director, or the Chief Clerk of the Smithsonian Institution.

The Janitors shall be instructed to detain packages, unless the bearer presents a permit signed by some officer whose name is on his permit-list. These permits shall be filed.

These rules do not apply to boxes and packages leaving the buildings under the management of the Registrar.

## CXL.

*Approvals.*—Requisitions for supplies shall require the approval of the chief of the department for which they are needed.

The written indorsement of the Director or the Assistant Director shall be necessary before proceeding with—

(1.) Any changes in arrangement or decoration of the buildings.

(2.) Any changes in the use or occupancy of apartments.

(3.) Any changes in the duties of Museum employés, except those of low grade.

(4.) Any changes in the installation of cases or other objects in the exhibition halls.

(5.) Any changes in the color or internal arrangement of cases.

(6.) Any changes in the installation of collections in the exhibition halls or the removal of objects.

(7.) The making of cases, pedestals, trays, labels, blank forms, or any other fixtures or appliances of general Museum administration.

(8.) Any temporary deviation from the provisions of the rules in the general orders.

(9.) Memoranda and requisitions referring to any of the above topics may be filed with the Superintendent of Buildings, with the Assistant Director, or with the Director. They must not be acted upon until properly indorsed.

## DEPARTMENT OF ELECTRIC SERVICE.

### CXLI.

*Apparatus.*—The following is a description of the apparatus in the Electric Room of the National Museum: One 50-drop annunciator with 29 telephone connections, of which 9 are connected with telephones in the Museum building, 11 in the Smithsonian building, and 9 to instruments at various outside points, including the central office of the telephone exchange, through which connnection may be had with any part of the city; one 100-drop annunciator to which are connected 300 windows and 85 doors throughout the Museum building; one 81-drop annunciator connected with the doors of the exhibition cases; one large watch clock for recording on paper dials the alarm signals which the watchman turns in from the twelve o'clock stations throughout the building as he makes his patrol; and one District telegraph alarm box. In the Smithsonian building there are nine clock stations, controlled in the same manner as those in the Museum building, and also a special telephone connection with the city.

### CXLII.

*Duties of Telephone Clerk.*—The Telephone Clerk is on duty from 8 o'clock a. m. to 4 o'clock p. m., and is to answer all calls promptly, and under no circumstances is the Telephone Room to be left unattended. A record is to be kept of all calls, giving the names of both the persons calling and called, and also of the exact time the call was made.

### CXLIII.

*Duties of Watchman in Telephone Room.*—The watchman on duty in the telephone room is required to answer all telephone calls, and to notify the watchmen in the building of signals on the burglar annunciator. He is also required to turn in a signal to the night-watch at the

District Telegraph Office every hour from 5 p. m. to 8 a. m. In case of neglect to do this a messenger is immediately sent to the Museum to ascertain the cause, and the fact is reported to the Superintendent the next morning.

### CXLIV.

*Duties of Watchman on Patrol.*—The watchman making the rounds of the building, which duty occupies exactly an hour, is required to turn in an alarm at each of the twelve stations. The time and place are registered on paper-dials which are kept on file in the Superintendent's office and renewed daily.

### CXLV.

*Signals.*—Signals may be made from the Electric Room upon signal bells in various parts of the building. These signals may be answered by persons upon the push-buttons, of which there are seventy-eight in the building, and the location of which is indicated by a white star. The code of signals being for the private use of the officers of the Museum, should be kept secret. The code for whistle signals is the same as that for bell signals.

## DEPARTMENT OF PREPARATION.

### CXLVI.

*Preparators' Records.*—Each Preparator must keep a record book in which to enter the name and catalogue number of each article passing through his hands, with statement of character of work done upon it and length of time devoted to it, name of person from whom received and to whom delivered, with dates.

### CXLVII.

*Instructions to Preparators.*—Each object sent to a Preparator must be accompanied by a memorandum giving its catalogue number and name, and with definite instructions as to character of work to be done, and to whom to be delivered.

### CXLVIII.

*Importance of Memoranda.*—Preparators should insist upon having such memoranda, and will be held accountable for failure to obtain them.

### CXLIX.

*Duties of Photographer.*—The Photographer is subject to the rules governing the action of Preparators. He shall take such photographs as he may receive written instructions for, and shall keep a perfect record of the negatives, property of the Museum, under his charge. Also one copy of each protograph he makes, arranged in suitable books in chronological order. He shall report monthly all work done for the Museum. He shall make requisition for such supplies as are necessary for the prosecution of Museum work.

## APPOINTMENTS, LEAVES OF ABSENCE, ETC.

### CL.

*Applications.*—All applications for positions must be made in writing. Applications, with the accompanying letters of recommendation, are to be filed in the office of the Chief Clerk of the Smithsonian Institution.

### CLI.

*Appointments.*—A letter of appointment, stating salary, terms of tenure, duties, &c., signed by the Director of the Museum, will be given each appointee. Appointments to grades lower than grade VI are made with the understanding that they are subject to recall at the end of each fiscal year.

### CLII.

*Promotions.*—Except in cases where the duties of an employé are changed to such an extent as to add greatly to the responsibility of his position, promotions can only be made at the beginning of each fiscal year. With each promotion a new letter of appointment will be issued by the Director.

### CLIII.

*Discharges and Suspensions.*—Any appointment may be canceled at the discretion of the Director. No discharge is valid until the person discharged has been notified by a formal letter of discharge signed by the Director. Suspension of pay may be made subject to the approval of the Director.

### CLIV.

*Leaves of Absence.*—Unusual leaves of absence and vacation of officers of the scientific staff be arranged by the Director. The ordinary vacations of preparators, mechanics, and administrative employés will be arranged by the Assistant Director, subject to the approval of the Director; those of laborers and cleaners by the Superintendent of the Buildings, subject to the approval of the Assistant Director.

### CLV.

*Temporary Employment.*—Laborers, mechanics, and copyists may be employed by the day at the discretion of the Assistant Director, in carrying out plans approved by the Director.

### CLVI.

*Record of Appointments, &c.*—A copy of each letter of appointment, promotion, or discharge shall be filed at once in the office of the Chief

Clerk of the Smithsonian Institution. On or before the 20th of each month a statement of the names and rates of compensation of each person temporarily employed during the month shall be submitted to the Chief Clerk of the Smithsonian Institution. Daily memoranda of action shall be submitted.

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[Proceedings United States National Museum, 1881. Appendix.]

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

## No. 2.

### CIRCULAR ADDRESSED TO FRIENDS OF THE MUSEUM.

The new Museum building is now finished, and the installation of the collections within its walls is being carried on as fast as exhibition cases can be built. The large additional space now available for the display of specimens renders it practicable for the officers of the Museum to carry out the long cherished plan of making it an educational exhibition of the most useful kind.

Few persons realize what a wealth of material is stored away in the vaults and attics of the Smithsonian building and the "Armory," which has been used as a deposit since 1876, in addition to the exhibits of the thirty or more foreign governments, given to the United States at the end of the Philadelphia Exposition, there is a still greater bulk of valuable material obtained then and since from private and State exhibitions made upon the same occasion.

Still more important are the collections made for that occasion by the Fish Commission and the Smithsonian Institution, and by the various agencies of the latter during the past twenty years, and which, for lack of room, have never been publicly exhibited.

In the new building will be concentrated all the industrial collections, and all the ethnological specimens, except the reserve series of pre-historic stone implements. In the old building will be kept those collections which are most important as material for purely scientific investigation, such as the main collection of birds, the fishes, and reptiles in alcohol, the marine invertebrates, &c. The new building will, however, contain the collections in economic natural history.

The collections in the new building are intended to form an *Anthropological Museum*, organized upon the broadest and most liberal interpretation of the term "anthropology," and illustrating the characteristics of civilized as well as savage races of mankind and their attainments in civilization and culture. The central idea will be *man*, and the manner in which he adapts the products of the earth to his needs. All useful and noxious animals, plants, and minerals will be shown, industries by means of which they are utilized—by both method and finished product—and finally, the various objects which men use for any purpose whatever. *A place is provided for every object which has a name.*

A thorough system of descriptive labels and guide-book manuals is provided for. No specimen will be exhibited which is not so thoroughly explained by its label that its significance may be understood by any intelligent visitor.

With this scope and this method of exhibition, the Museum will be of greater educational value than any similar museum heretofore organized, since a single series of selected objects will replace the numerous partial series such as are seen in every industrial fair. The arrangement of these in a philosophical manner will add greatly to their significance.

In displaying and labeling the objects in the Museum its officers are striving to profit by the experience of all the best museums of Europe, which have been visited and carefully studied with this end in view.

In certain departments the National Museum is already richer than any other, notably in the ethnology of the native races of America, the zoology of the United States, the department of animal products, the department of fisheries, that of building stones, and that of North American ores.

In other sections, by the coöperation of prominent experts and business houses, collections are being made with much thoroughness. For instance, the materia medica collection is in charge of Schieffelin & Co., of New York, who are sparing no pains or expense in making it complete; F. W. Devoe & Co. are doing the same thing for paints and pigments; H. K. and F. B. Thurber for food products; Powers & Weightman, of Philadelphia, for chemical products used in the arts, &c. Mr. Edward Atkinson, in connection with his census investigations on the cotton industries, has gathered for the Museum a complete series of the cotton fabrics made in the United States, and the Department of State has deposited the large collection of cotton fabrics of foreign countries, gathered by its agents for the Atlanta Cotton Exposition.

It is the policy of the Museum to enlist the aid of some prominent expert, or some leading business house, in making up the display for each special industry. It has been very gratifying to find that all who have as yet been invited to help have willingly and enthusiastically complied.

It is hoped that the possessors of valuable private collections may find it to their interest to deposit them in the National Museum, and to bring about this result the authorities of the Museum have an additional incentive to make the display of articles in their custody as attractive as possible.

In arranging for the reception of collections, the Museum agrees to furnish exhibition cases, and also bottles and such other accessories for mounting as are necessary for the most effective display.

Each individual object will have a conspicuously printed label, upon which will be placed the name of the donor, which will also be published in all catalogues and other publications of the Museum in which they are referred to.

The Museum will pay transportation charges on collections sent.

Contributors are requested to supply all available information regarding specimens which they may send.

SPENCER F. BAIRD,

*Secretary Smithsonian Institution, and Director U. S. National Museum.*

JANUARY 1, 1882.

[Proceedings United States National Museum, 1881. Appendix.]

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 3.

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## CIRCULAR IN REFERENCE TO PETROLEUM COLLECTIONS.

MY DEAR SIR: Prof. S. F. Peckham, of Providence, R. I., has been requested by myself to collect and arrange for exhibition a suite of specimens of petroleum which will illustrate the occurrence of that important substance in the United States. Will you render him such assistance as you may be able, and oblige,

Very truly yours,

S. F. BAIRD,
*Secretary Smithsonian Institution,*
*and Director United States National Museum.*

WASHINGTON, D. C., *January* 1, 1882.

---

MY DEAR SIR: Will you please send me a sample of petroleum by

express from ______________________________

______________________________

______________________________

Please send at least a quart. Will you also fill out and sign the certificate hereto attached as fully as you may be able.

Very respectfully,

The accompanying specimen of petroleum, furnished the National Museum at Washington, occurs as follows:

State,

County,

Township,

Farm,

Lease,

Number or name of well,

Depth of well,

When drilled (completed),

Oil in sand,

Oil in crevice,

First, second, or third sand?

Thickness of sand,

Pebble or fine sand,

Yield of well on first day of flow, bbls.,

Yield of well on first day of pumping, bbls.,

Was the well torpedoed?

Sp. gr. of oil,

Geological formation *from which the oil came*,

Address of donor.

[Proceedings United States National Museum, 1881. Appendix.]

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 4.

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## CIRCULAR CONCERNING THE DEPARTMENT OF INSECTS.

Prof. C. V. Riley has deposited in this Museum his extensive private collection of insects. The collection comprises some 30,000 species and upward of 150,000 specimens of all orders, and is contained in some 300 double folding-boxes in large book form and in two cabinets of 80 glass-covered drawers. The specimens are all in admirable condition, and the determined species duly labeled and classified. The collection is chiefly valuable, however, for the large amount of material illustrating the life-histories, habits, and economy of species, 3,000 of which are represented in one or all of the preparatory states, either in liquid in separate boxes, or blown and mounted dry with the imagines. Fifteen blank books are filled with notes and descriptions of these species, most of them yet unpublished. Though several special collections surpass it in a single order, few, if any, general collections of North American insects equal it, and perhaps none from the biological point of view.

The Museum is now prepared to properly care for such collections, under direction of Professor Riley, who has been appointed honorary curator of insects, and it is hoped that in time, with so good a beginning, a truly national exposition of the insect fauna of the country will be brought together. The Museum building is entirely fire-proof, and there is every facility for the safe preservation of specimens or collections that may be donated. I would especially request that correspondents send the adolescent states in connection with mature forms whenever possible, together with all material exemplifying the transformations, architecture, and economy of species. I would also invite those engaged in descriptive entomology to deposit in the Museum types or duplicates of their described species, it being my intention not only to build up a systematic national collection that students may profitably consult, and which will be kept in secure cabinets to be used only by such students, but to have in connection therewith a more popular exhibit for the instruction and edification of the public.

SPENCER F. BAIRD,
*Secretary Smithsonian Institution,*
*and Director United States National Museum.*

JANUARY 1, 1882.

[Proceedings United States National Museum, 1881. Appendix.]

# SMITHSONIAN INSTITUTION.

# UNITED STATES NATIONAL MUSEUM.

## No. 5.

## ESTABLISHMENT AND OFFICERS.

### MEMBERS (EX-OFFICIO) OF THE SMITHSONIAN INSTITUTION.

| | |
|---|---|
| CHESTER A. ARTHUR, President of the United States | *Presiding Officer, ex-officio.* |
| MORRISON R. WAITE | *Chief Justice of the United States.* |
| FREDERICK T. FRELINGHUYSEN | *Secretary of State.* |
| CHARLES J. FOLGER | *Secretary of the Treasury.* |
| ROBERT T. LINCOLN | *Secretary of War.* |
| WILLIAM H. HUNT | *Secretary of the Navy.* |
| SAMUEL J. KIRKWOOD | *Secretary of the Interior.* |
| TIMOTHY O. HOWE | *Postmaster-General.* |
| BENJAMIN F. BREWSTER | *Attorney-General.* |
| EDGAR M. MARBLE | *Commissioner of Patents.* |

### REGENTS OF THE INSTITUTION.

| | |
|---|---|
| MORRISON R. WAITE, Chief Justice of the United States | *Chancellor.* |
| GEORGE F. HOAR, (of Worcester, Mass.) | *Member of the Senate of the United States.* |
| NATHANIEL P. HILL, (of Denver, Colo.) | *Member of the Senate of the United States.* |
| SAMUEL B. MAXEY, (of Paris, Texas) | *Member of the Senate of the United States.* |
| NATHANIEL C. DEERING, (of Osage, Iowa) | *Member of the House of Representatives.* |
| EZRA B. TAYLOR, (of Warren, Ohio) | *Member of the House of Representatives.* |
| SAMUEL S. COX, (of New York City) | *Member of the House of Representatives.* |
| JOHN MACLEAN, (of Princeton, New Jersey) | *Professor in the College of New Jersey.* |
| PETER PARKER, (of Washington.) | |
| WILLIAM T. SHERMAN, (of Washington) | *General of the Army of the United States.* |
| ASA GRAY, (of Cambridge, Mass.) | *Professor in Harvard University.* |
| HENRY COPPÉE, (of Bethlehem, Pennsylvania) | *Professor in Lehigh University.* |
| NOAH PORTER, (of New Haven, Connecticut) | *President of Yale College.* |
| PETER PARKER,<br>JOHN MACLEAN,<br>WILLIAM T. SHERMAN, | *Executive Committee of the Board of Regents.* |

### OFFICERS OF THE INSTITUTION.

| | |
|---|---|
| CHESTER A. ARTHUR, President of the United States | *Ex-officio Presiding Officer.* |
| MORRISON R. WAITE, Chief Justice of the United States | *Chancellor of the Institution.* |
| SPENCER F. BAIRD | *Secretary of the Institution.* |
| WILLIAM J. RHEES | *Chief Clerk of the Institution.* |

## OFFICERS OF THE NATIONAL MUSEUM.

SPENCER F. BAIRD, *Secretary of the Smithsonian Institution: Director of the Museum.*

G. BROWN GOODE…… *Assistant Director: Curator, Department of Arts and Industries.*

| | |
|---|---|
| TARLETON H. BEAN | *Curator, Department of Fishes.* |
| WILLIAM H. DALL | *Honorary Curator, Department of Mollusks.* |
| FREDERICK P. DEWEY | *Assistant, Department of Minerals and Economic Geology.* |
| JAMES M. FLINT | *Honorary Curator, Section of Materia Medica.* |
| J. HOWARD GORE | *Honorary Curator, Section of Foods.* |
| GEORGE W. HAWES | *Curator, Department of Minerals and Economic Geology.* |
| RICHARD RATHBUN | *Curator, Department of Marine Invertebrates.* |
| CHARLES RAU | *Curator, Department of Antiquities.* |
| ROBERT RIDGWAY | *Curator, Department of Birds.* |
| CHARLES V. RILEY | *Honorary Curator, Department of Insects.* |
| R. W. SHUFELDT | *Honorary Curator, Section of Bird Skeletons.* |
| ROBERT E. C. STEARNS | *Assistant, Department of Mollusks.* |
| FREDERICK W. TAYLOR | *Chemist.* |
| FREDERICK W. TRUE | *Librarian: Curator, Department of Mammals.* |
| LESTER F. WARD | *Honorary Curator, Department of Fossil Plants.* |
| CHARLES A. WHITE | *Curator, Department of Fossil Invertebrates.* |
| HENRY C. YARROW | *Honorary Curator, Department of Reptiles.* |

| | |
|---|---|
| STEPHEN C. BROWN | *Registrar.* |
| HENRY HORAN | *Superintendent of Buildings.* |
| JOSEPH PALMER | *Chief Modeler.* |
| WILLIAM T. HORNADAY | *Chief Taxidermist.* |

JANUARY 1, 1882.

[Proceedings United States National Museum, 1881. Appendix.]

# SMITHSONIAN INSTITUTION.

## UNITED STATES NATIONAL MUSEUM.

### No. 6.

# CLASSIFICATION AND ARRANGEMENT OF THE MATERIA MEDICA COLLECTION.

**By JAMES M. FLINT, Surgeon, U. S. Navy.**

### PRIMARY DIVISIONS.

I. Inorganic Materia Medica.

II. Organic Materia Medica,
- 1. Vegetable products.
- 2. Products of fermentation and distillation.
- 3. Animal products.

### I.

Medicines of the Inorganic Division to be classified according to their fundamental elementary constituents, following the order of the elements, given in Roscoe and Schorlemmer's Treatise on Chemistry.

With each elementary substance, to be arranged—

1. The chemical compounds of that element used in medicine and pharmacy.

2. The preparations of which that element, or any of its compounds, constitutes the fundamental ingredient.

These preparations to include—

*a.* The official preparations of the United States Pharmacopœia.

*b.* The official preparations of foreign Pharmacopœias which are not recognized by the United States Pharmacopœia.

*c.* Unofficial preparations which are considered to be of sufficient importance or interest to be worthy a place in the collection.

Poisonous salts, liable to be mistaken, on account of similarity of appearance, for those less active, should be shown with the latter also.

### II.

1. Vegetable products to be classified according to the botanical affinities of the plant from which derived, following the sequence given in Bentham and Hooker's Genera Plantarum, beginning with the lowest order.

Under each natural order to be arranged—

A. The official drugs derived from each plant of that order.

B. Drugs not official in any Pharmacopœia, but which are or have been used in medicine.

With each crude drug to be displayed—

*a.* A colored plate of the plant from which it is derived, with figures illustrating its botanical characters.

*b.* A specimen of the flowering plant, pressed and dried, in the usual manner of an herbarium.

*c.* The drug in all its varieties, commercial and botanical. These specimens primarily should be fair commercial samples, such as will honestly represent the article as found in the market. They may be supplemented by carefully selected, or rare samples, or by those adulterated or possessing interesting peculiarities of any kind. The commercial and botanical sources of each should be authenticated. The practical value of the collection will largely depend upon the completeness and accuracy of this portion of the exhibit.

*d.* Sections of roots, stems, barks, etc., to show structure, fracture, or other physical characters that may assist in their identification, with drawings of the same, magnified, if necessary.

*e.* Preparations, official and other, of which the drug or any product of the drug constitutes the fundamental ingredient.

2. Products of fermentation and distillation will include the products of the acetous and vinous fermentations, and the derivatives, chloroform, ether, etc., as well as distillates, such as carbolic acid, pyroligneous acid, etc.

3. Medicines of animal origin to follow the usual classification of the animals from which the crude drug is obtained.

Each group of specimens, arranged under one head, to have a descriptive card, giving in brief terms the most important facts relating to general character, source, commercial varieties, etc.

Each specimen to have its label, giving scientific and vernacular names, and such special information as can be condensed within the prescribed limits.

[Proceedings United States National Museum, 1881. Appendix.]

# SMITHSONIAN INSTITUTION.

## UNITED STATES NATIONAL MUSEUM.

## No. 7.

# A CLASSIFICATION OF THE FORMS IN WHICH DRUGS AND MEDICINES APPEAR, AND ARE ADMINISTERED.

By **JAMES M. FLINT, Surgeon, U. S. Navy.**

The following classification has been prepared as the basis of a special exhibit in the Materia Medica section of the National Museum, illustrative of the forms in which medicinal substances appear in commerce, or are prepared for adminstration by the pharmacist.

The exhibit is intended to illustrate this classification by actual specimens, which shall be, as nearly as possible, representatives of their respective classes. The list of examples is provisional only, and subject to such modifications as a larger experience may suggest.

The effort has been made so to condense each definition that it may be conspicuously printed on the label of the jar or bottle containing the specimen, together with the name of the latter.

## CLASSIFICATION OF MEDICINAL FORMS.

### I.—CRUDE VEGETABLE DRUGS.

| | | Examples. |
|---|---|---|
| **Radices.**<br>(Roots.) | The descending axes of plants, never developing leaves, and having for their function the absorption of nutriment from the soil. | Senega.<br>Ipecac. |
| **Rhizomata.**<br>(Rhizomes.) | Subterranean stems, consisting of a succession of joints, developing leaves in the form of scales, and producing axillary buds. | Galangal.<br>Spigelia.<br>Solomon's Seal. |
| **Tubera.**<br>(Tubers). | Thickened, fleshy underground stems, or branches, bearing rudimentary leaf buds. | Jalap. |
| **Bulbi.**<br>(Bulbs.) | Very short subterranean stems covered with leaves or the bases of leaves in concentric layers, and producing roots from below. | Garlic.<br>Onion. |
| **Cormi.**<br>(Corms.) | Very short subterranean stems bearing buds on the upper surface and producing roots from below. Distinguished from bulbs by the absence of foliate structure. | Colchicum. |
| **Ligna.**<br>(Woods.) | The solid portions of the stems of exogenous plants, as distinguished from barks and piths. | Guiacum. |

## *Classification of medicinal forms*—Continued.

### I.—CRUDE VEGETABLE DRUGS—Continued.

| | | Examples. |
|---|---|---|
| **Cortices.**<br>(Barks.) | The covering of the stems and roots of exogenous plants, outside of the wood. | Oak.<br>Cinnamon. |
| **Medulæ.**<br>(Piths.) | The cellular central portion of exogenous stems. | Sassafras pith. |
| **Herbæ.**<br>(Herbs.) | Plants which die, to the ground at least, after ripening the seed or on the approach of winter. In commerce comprises those drugs which consist of the whole herb, or of the stems, leaves, and flowering tops of herbs. | Absinthe. |
| **Stipites.**<br>(Stems.) | The stalks and branches of herbs deprived of leaves, flowers, and fruit. | Dulcamara. |
| **Summitates vel Cacumina.**<br>(Tops.) | The small terminal branches of plants. | Savin. |
| **Gemmæ vel Turiones.**<br>(Buds.) | Branches or leaves in their earliest or undeveloped state. | Balm of Gilead Buds.<br>Poplar Buds. |
| **Folia.**<br>(Leaves.) | The green deciduous organs of plants formed by expansion of the bark at the nodes of the stem. | Buchu.<br>Jaborandi. |
| **Flores.**<br>(Flowers.) | The organs of reproduction of phenogamous plants. | Santonica.<br>Orange.<br>Arnica. |
| **Petala.**<br>(Petals.) | The leaves of the corolla; flower-leaves. | Rose. |
| **Stigmata.**<br>(Stigmas.) | The tops of the pistils of flowers, being that part which receives the pollen. | Crocus. |
| **Fructus.**<br>(Fruits.) | The matured ovaries of plants, with their contents. | Anise.<br>Juniper.<br>Hips.<br>Colocynth. |
| **Capsulæ.**<br>(Capsules.) | Seed vessels which burst open at maturity, allowing the seeds to fall out. | Poppy. |
| **Semina.**<br>(Seeds.) | Those parts of the fruit which contain the embryos (or undeveloped plantlets), and by means of which the higher plants are chiefly propagated. | White Mustard.<br>Castor.<br>Nux vomica. |
| **Trichomes.**<br>(Hairs.) | Hair-like appendages to the surfaces of plants. | Mucuna. |
| **Glandulæ.**<br>(Glands.) | Small cellular organs which secrete oily, aromatic, and other products. | Lupulin. |
| **Pulpæ.**<br>(Pulps.) | The soft and parenchymatous parts of vegetables, reduced to a paste by the operation of pulping. | Tamarind Pulp. |
| **Succi.**<br>(Juices.) | The fluid obtained by bruising or pressing plants, or parts of plants.<br>Rob, or Roob, is a juice evaporated to the consistency of honey. | Conium Juice. |

*Classification of medicinal forms*—Continued.

I.—CRUDE VEGETABLE DRUGS—Continued.

| | | Examples. |
|---|---|---|
| **Gummata.**<br>(Gums.) | Solid, uncrystallizable vegetable exudations, insoluble in alcohol, but wholly or partially soluble in water, forming mucilage. | Acacia. |
| **Balsama.**<br>(Balsams.) | Natural vegetable products which contain resin, volatile oil, and benzoic or cinnamic acid. | Balsam Copaiba. |
| **Resinæ.**<br>(Resins.) | Solid, brittle, inflammable, translucent vegetable products, insoluble in water, but soluble in alcohol, ether, and essential oils. | Rosin, common yellow. |
| **Gummi-resinæ.**<br>(Gum resins.) | Compounds of gum, resin, and other vegetable products, exuding from incisions made in certain plants. | Ammoniac. |
| **Feculæ.**<br>(Starches.) | Abundant vegetable principles, having the composition $C_6H_{10}O_5$; of definite form, tasteless, inodorous, insoluble in cold water, alcohol, and ether. | Wheat Starch. |
| **Sacchara.**<br>(Sugars.) | Neutral substances, mostly of vegetable origin, having a sweet taste, soluble in water and dilute alcohol; insoluble in ether. | Cane Sugar. |

II.—CHEMICAL PRODUCTS.

| | | |
|---|---|---|
| **Metals.** | Elementary bodies having a metallic luster, good conductors of heat and electricity, and capable of combination with oxygen to form bases. | Iron Filings. |
| **Metallic oxides.** | Products of the chemical union of metals with oxygen. | Red Oxide of Mercury. |
| **Metallic salts.** | Compounds in which one or more of the equivalents of hydrogen in an acid are replaced by a metal. | Sulphate of Copper. |
| **Mineral acids.** | Acids of inorganic origin. | Sulphuric Acid. |
| **Vegetable alkalies.** | Substances derived by chemical processes from vegetable products, capable of union with acids to form salts. | Cinchonia. |
| **Vegetable acids.** | Acids of vegetable origin. | Tartaric Acid. |
| **Salts of vegetable acids.** | Products of the combination of vegetable acids with bases, either organic or inorganic. | Citrate of Iron and Quinine. |
| **Salts of vegetable bases.** | Products of the combination of vegetable bases with acids, either mineral or vegetable. | Sulphate of Strychnia. |
| **Neutral organic substances.** | Substances obtained by chemical processes from vegetable or animal products, not forming salts with acids or bases. | Digitalin. |

## *Classification of medicinal forms*—Continued.

### III.—PHARMACEUTICAL PREPARATIONS.

### A.—*Solids.*

| | | Examples. |
|---|---|---|
| **Species.**<br>(Species.) | Mixtures of several plants or parts of plants, dried and cut into small fragments. Used for making decoctions, infusions, etc. | Species Pectorales (Ph. G.) |
| **Pulveres.**<br>(Powders.) | Substances reduced into small particles by trituration, precipitation, granulation, or sublimation. | Powder of Ipecac. |
| **Pilulæ.**<br>(Pills.) | Small globular masses of a size that may be swallowed without mastication. | Not coated.<br>Sugar coated.<br>Gelatine coated.<br>Silver-leaf coated.<br>Gold-leaf coated.<br>Compressed.<br>Printed.<br>Granules.<br>Boluses, etc.<br>Capsules:<br>  Gelatine.<br>  Pearls.<br>  Folding, etc. |
| **Extracta.**<br>(Extracts.) | Solid preparations resulting from the evaporation of solutions of vegetable principles. | Extract of Gentian. |
| **Resinæ.**<br>(Resins.) | Medicines prepared by exhausting the substances from which they are obtained by alcohol, and precipitating the resinous matter with water. | Resin of Jalap. |
| **Confectiones.**<br>(Confections.) | Soft solid medicines, in which the medicinal substances are incorporated with sugar or honey. The term includes Electuaries and Conserves. | |
| **Electuariæ.**<br>(Electuaries.) | Medicinal substances, generally in the form of dry powders, combined with sirup or honey. | Confection of Senna. (U. S. Ph.) |
| **Conservæ.**<br>(Conserves.) | Consist of recent vegetable substances and refined sugar beaten into a uniform mass. | Confection of Rose. (Br. Ph.) |
| **Chocolatæ.**<br>(Chocolates.) | Medicines of which the vehicle is a mixture of chocolate and sugar. | Chocolat Ferrugineux. (Codex.) |
| **Pastæ.**<br>(Pastes.) | Compounds of medicinal substances with sugar and gum. Their soft solid consistence distinguishes them from troches. | Marshmallow paste. |
| **Saccharureta.**<br>(Saccharures.) | Medicines in the form of powder, composed of sugar mixed with medicinal substances. | Saccharure de Lichen. (Codex.) |
| **Oleosaccharureta.**<br>(Oleosaccharures.) | Medicines composed of essential oil and sugar. | Oleosaccharure d'anis. (Codex.) |

## *Classification of medicinal forms*—Continued.

### III.—Pharmaceutical preparations—Continued.

### A.—*Solids*—Continued.

| | | Examples. |
|---|---|---|
| **Trochisci.** (Lozenges; Troches; Tablettes, Codex.) | Compounds of sugar with medicinal substances, made into paste with mucilage, cut into various shapes and dried. | Troches of Potassium Chlorate. |
| **Rotulæ.** (Sugardrops; Pastilles, Codex.) | Compounds of medicinal substances with sugar, differing from troches in being prepared with the aid of heat. | Peppermint Drops. |
| **Gelatinæ.** (Jellies.) | Soft solid compounds of medicinal substances, with gelatinous or gummy matters, having the well-known trembling consistence of jelly. | Gelée de Carragaheen. (Codex.) |
| **Sapones.** (Soaps.) | Products obtained by treating fatty bodies, with alkalies dissolved in water. | White Castile Soap. |
| **Unguenta.** (Ointments.) | Topical applications of such consistence that they may be easily rubbed on the skin, becoming gradually liquefied. | Ointment of Rosewater. |
| **Cerata.** (Cerates.) | Unctuous preparations of such consistence that they may be spread at ordinary temperatures, but do not melt when applied to the skin. | Goulard's Cerate. |
| **Emplastra.** (Plasters.) | Solid preparations which are spread by heat, and which are adhesive at the temperature of the body. | Lead Plaster. |
| **Sparadrapa.** (Sparadraps.) | Plasters spread upon leather, linen, muslin, or silk. | Adhesive Plaster on cloth.<br>Adhesive Plaster on leather.<br>Isinglass Plaster.<br>Court Plaster. |
| **Chartæ.** (Med. papers.) | Paper impregnated with medicinal substances or upon which preparations resembling plasters have been spread. | Cantharides Paper. |
| **Suppositoria.** (Suppositories.) | Solid medicinal preparations intended to be introduced into the rectum or vagina. | Suppositories of Tannin. |
| **Cataplasmata.** (Cataplasms; Poultices.) | Topical applications of the consistence of soft paste, composed of powders mixed with water, various solutions or fixed oils. | |
| **Cigarettes.** | Dried medicinal plants cut fine and rolled in papers for smoking. | Cigarettes of Stramonium. (Codex.) |
| **Pastilli.** (Pastilles.) | Compounds of aromatic substances used in fumigation. | Fumigating Pastilles. |

## *Classification of medicinal forms*—Continued.

### III.—PHARMACEUTICAL PREPARATIONS—Continued.

### B.—*Liquids.*

| | | Examples. |
|---|---|---|
| **Decocta.**<br>(Decoctions.) | Solutions of vegetable principles obtained by boiling in water. | Decoction of Senega. |
| **Infusa.**<br>(Infusions.) | Solutions of vegetable principles, made with hot or cold water *without boiling.* | Infusion of Wild Cherry. |
| **Ptisanæ.**<br>(Tisanes.) | Very dilute infusions intended for use as habitual drinks by the sick. | Tisane de Gentiane. (Codex.) |
| **Liquores.**<br>(Solutions.) | Aqueous solutions in which the substance acted upon is wholly soluble in water. | Solution of the Arsenite of Potassium. |
| **Aquæ medicatæ.**<br>(Medicated waters.) | Aqueous solutions of volatile oils or gases. | Cinnamon Water. |
| **Mucilagines.**<br>(Mucilages.) | Aqueous solutions of gum or allied substances. | Mucilage of Sassafras Pith. |
| **Misturæ.**<br>(Mixtures.) | Preparations containing medicinal substances *in suspension* in watery fluids. In a more general sense, liquid preparations composed of several ingredients, and not otherwise classified. | Compound Mixture of Iron. |
| **Emulsiones.**<br>(Emulsions.) | Mixtures in which the suspended substance is of an oleaginous or resinous nature, suspension being aided by gum or yolk of egg. | Ammoniac Mixture. |
| **Linctus.**<br>(Linctures.) | Medicines of sirupy consistence, formerly sucked from end of a liquorice stick. | Looch Blanc. (Codex.) |
| **Syrupi.**<br>(Syrups.) | Concentrated solutions of sugar in watery fluids, either with or without medicinal impregnation. | Syrup of Rhubarb. |
| **Mellita.**<br>(Honeys.) | Preparations in which honey is used as the vehicle of the medicinal substance. | Honey of Rose. |
| **Oxymellita.**<br>(Oxymels.) | Medicated honeys containing acetic acid. | Oxymel of Squill. |
| **Aceta.**<br>(Vinegars.) | Includes distilled vinegar and infusions and solutions of medicinal substances in vinegar or acetic acid. | Vinegar of Lobelia. |
| **Tincturæ.**<br>(Tinctures.) | Solutions of medicinal substances in alcohol, prepared by maceration, digestion, or percolation. *Elixirs* are compound tinctures, generally highly flavored and sweetened. | Tincture of Guaiac. |
| **Alcoolaturæ.**<br>(Alcoolatures.)<br>(Codex.) | Tinctures prepared with fresh plants. | Tincture of Fresh Orange Peel. (Br. Ph.) |
| **Tincturæ aethereae.**<br>(Ethereal tinctures.) | Liquid preparations in which the menstruum is a mixture of alcohol and ether. | Ethereal Tincture of Lobelia. |

*Classification of medicinal forms*—Continued.

III.—PHARMACEUTICAL PREPARATIONS—Continued.

B.—*Liquids*—Continued.

| | | Examples. |
|---|---|---|
| **Vina.**<br>(Wines.) | Preparations analogous to tinctures in which the menstruum is wine. | Wine of Antimony. |
| **Cerevisiæ.**<br>(Beers.) | Medicinal preparations in which beer is the solvent. | Bière antiscorbutique. (Codex.) |
| **Spiritus.**<br>(Spirits.) | Alcoholic solutions of volatile principles, prepared by distillation or solution. | Spirits of Lavender. |
| **Ætherea.**<br>(Ethers.) | Peculiar, fragrant, sweetish, very volatile inflammable substances, formed by the action of acids on alcohol. | Acetic Ether. |
| **Oleoresinæ.**<br>(Oleoresins.) | Extracted from drugs by means of ether. They have the property of retaining their fluidity and composition after the evaporation of the menstruum. | Oleoresin of Cubebs. |
| **Extracta fluida.**<br>(Fluid extracts.) | Permanent concentrated solutions of vegetable drugs. Prepared by percolation and concentration. | Fluid Extract of Gentian. |
| **Glycerita.**<br>(Glycerites.) | Solutions of medicinal substances in glycerine. | Glycerite of Tannic Acid. |
| **Olea destillata.**<br>(Volatile oils.) | Volatile oils obtained from plants by distillation. | Oil of Cloves. |
| **Olea pinguia.**<br>(Fixed oils.) | Non-volatile oils obtained from both the animal and vegetable kingdoms. Generally compounds of glycerine, with a peculiar acid. | Castor Oil. |
| **Olea infusa.**<br>(Medicated oils.) | Infusions of medicinal substances in fixed oils. | Oleum Hyosciami Infusum (Ph. G.) |
| **Linimenta.**<br>(Liniments.) | Liquid or semi-liquid preparations intended for application to the skin by friction. | Soap Liniment. |
| **Enemata.**<br>(Enemas.) | Liquid medicines intended for injection into the rectum. | Enema of Opium. |
| **Jusculi.**<br>(Broths.) | Decoctions having for their base the flesh of animals, to which medicinal substances may be added. | Chicken. |

[Proceedings United States National Museum, 1881. Appendix.]

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 8.

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# MEMORANDA FOR COLLECTORS OF DRUGS FOR THE MATERIA MEDICA SECTION OF THE NATIONAL MUSEUM.

**By JAMES M. FLINT, Surgeon U. S. Navy.**

To carry out the plan adopted for the Materia Medica Section of the National Museum, it will be necessary to obtain specimens of all substances used as medicines by the people of all countries. That these specimens may be more than mere museum curiosities, it is important that information be furnished regarding the source and mode of production of each drug. Much doubt still remains as to the exact source of many of the standard articles of the materia medica, and a reinvestigation of any or all of them is to be desired.

The following suggestions are made for those more or less unacquainted with the subject who may have opportunities for making collections, and as aids to memory for the expert:

I. Obtain specimens of all substances used as medicines, and all drugs which are cultivated, or collected for export, in the region visited.

II. Gather as much information as possible concerning each specimen, under the following heads:

If of vegetable origin—

1. Name, commercial, vernacular, and scientific.
2. Botanical and common name of the plant from which the drug is derived.
3. Character of the region in which produced. (Mountain or valley, dry or wet ground, &c.)
4. Mode of cultivation or collection, and preparation for use or the market.
5. Commercial importance (quantity, value, &c.).
6. Supposed medical properties and uses.
7. History of the individual specimen.

It is of the greatest importance to obtain pressed specimens of the flowering plant from which each drug is derived for botanical identification. If a large plant, a single branch, bearing leaves and flowers, may be pressed, or even leaves and flowers separated from the stem. Get seeds also, especially if the flowering plant cannot be had, so that the plant may be propagated in the hot house.

Plants are easily pressed by arranging them while fresh on sheets of absorbent paper, and putting them between boards, under moderately heavy weights. The papers should be changed every day until the specimens are dry.

If of animal origin—
1. Name of drug.
2. Name and description of animal from which obtained.
3. How obtained and prepared.
4. How used.

If of mineral origin—
1. Name.
2. Source.
3. Composition.
4. Mode of preparation.
5. Medical uses.

III. Bear always in mind that the value of every specimen in each of these divisions will be directly proportionate to the amount of accurate information which accompanies it, especially such as relates to source and mode of production. Everything which will help to illustrate and substantiate this information will be worth diligent search and careful preservation.

[Proceedings United States National Museum, 1881.—Appendix.]

# SMITHSONIAN INSTITUTION.

## UNITED STATES NATIONAL MUSEUM.

## No. 9.

## CIRCULAR IN REFERENCE TO THE BUILDING-STONE COLLECTION.

The special investigation of the building-stone industry of the United States made by the Tenth Census is now nearly completed, as far as field work is concerned. It has been a part of the work of this investigation to forward to the National Museum samples of all stones quarried for purposes of construction. These specimens were mostly of such size that they could be dressed into four-inch cubes. Over 3,000 such specimens have been received at the National Museum, and nearly one-half of the number have already been dressed in the following manner: Polished in front; drafted and pointed on the left-hand side; drafted rock face upon the right-hand side; entirely rough behind, and rubbed or chiselled upon the top and bottom. As soon as dressed, the samples are placed in suitable cases, where they may be examined by all who are interested in building stones.

All the building stones of the country are thus brought together for study and comparison. Stones which have not been quarried until recently may be compared with stones of the same kind which have long been in use, and the qualifications of which are well known.

There is also quite a large collection of foreign stones with which comparisons may be made. Nearly every foreign quarry, the product of which is in the markets of this country, is represented by a specimen. There are also quite a number of specimens from foreign quarries, the products of which have been but little or not at all in the markets of the United States.

This collection is now perhaps the largest, most complete, and systematic of any of its kind in the world.

Thin sections for microscopic examination are being prepared from all the different specimens. The purposes of the investigation demand a determination of the compositions and structures of the various rocks, as these in combination with the location and geological features determine the applicability of the stones to various uses, and explain their peculiar properties, and the desired results are most directly obtained by the microscopic examination of thin sections.

This method of study in the hands of the microscopic lithologists has been most fruitful in developing valuable and interesting knowledge of a scientific character. By its means the nature and composition of almost all of the commonly occurring rocks have been determined, and exactly those same features which are of importance in scientific study are the ones which determine the value and appearance of building stones, and there is no distinction between the scientific and the practical.

The microscopic study of these stones is supplemented by chemical analysis, which is often necessary to determine important points.

In the older and more developed States there are perhaps quarries worked in all the different kinds of rock suitable for building and ornamental stones, and, since the special agents of the Tenth Census, who were engaged on the building-stone investigation, forwarded to the National Museum specimens representing all working quarries, it is probable that the building stones of these States are quite fully represented.

In the newer portions of the country, however, the best building stones are not always worked, and since these special agents were instructed to incur no extra expense for collecting information concerning undeveloped material, many of the best stones in these portions of the country are not represented by specimens in the National Museum.

The following table shows the localities from which samples of building stone have been received in those States and Territories in which there are probably other localities which might furnish excellent building stone.

It often happens in a new country that, when a costly building is to be constructed, stone is brought from a great distance at great expense, even if in the immediate vicinity there is an abundance of stone equally good. The home product is not rejected because of prejudice, but because it has not been tried, and because there are no adequate means at hand for examining the material and comparing it with the stones that have been tried.

The collection of specimens of all regularly quarried stones has been most complete and successful. Quite a large number of specimens of stones, but little or not at all quarried, have also been obtained through the special agents of the Census, or through parties interested in the development of the resources of their respective neighborhoods; but there are undoubtedly a very large number of localities which have excellent building stones, and from which no specimens have been sent to the National Museum, and concerning which we possess no information.

That a thorough knowledge of the building stones of any country is of great economic value is unquestionable, and in a rapidly growing country like ours such knowledge is of incalculable value.

It is the purpose of this circular to bring to the attention of those interested in the development of the building-stone resources of their own districts the work that is being done in this connection by the Tenth Census in co-operation with the National Museum, and it is hoped that specimens and information may be received from most, if not all, the localities having valuable undeveloped building stones, in time, that this information, together with the results of the examination of the specimens may be embodied in the Census Report upon the building-stone industry of the United States.

Any parties who may be interested in furnishing such information, and in forwarding specimens will be furnished with schedules to indicate the nature of the information desired, and with franked labels with which to forward specimens through the mails.

SPENCER F. BAIRD,
*Secretary Smithsonian Institution,*
*and Director United States National Museum.*

*Statement showing localities from which samples of building stone have been received, in States and Territories from which a more complete collection of specimens of building stones is desired.*

[No specimens have been received from the Indian Territory and Arizona.]

Virginia.
North Carolina.
Georgia.
Florida.
Alabama.
Kentucky.
Arkansas.
Texas.
Dakota.
Montana.
Colorado.
New Mexico.
Utah.
Nevada.
Idaho.
Washington Territory.
Oregon.
Wyoming.
California.

*Localities from which specimens of building stone have been received at the National Museum.*

VIRGINIA

| No. | Name of stone. | Town. | County. | Quarry. |
|---|---|---|---|---|
| 2 | Granite | Near Fredericksburg | Spottsylvania | E. J. Leyburn. |
| 2 | do | Tuckahoe district | Henrico | J. B. Mitchell & Co. |
| 2 | do | Near Richmond | do | Richmond Granite Company. |
| 4 | do | Manchster | Chesterfield | Westham Granite Company. |
| 2 | do | Granite | do | Old Dominion Granite Co. |
| 2 | Slate | Near New Canton | Buckingham | Edwards & Roberts. |
| 1 | Limestone | Near Staunton | Augusta | Red Bnd Slate Company. |
| 2 | Slate | Near New Canton | Buckingham | J. R. Williams & Co. |
| 2 | Granite | Namozine district | Dinwiddie | D. W. Lassiter, Smith & Southall lessees. |
| 2 | do | do | do | Mayfield Quarry, Gill & Hubbard lessees. |
| 2 | Gneiss | Lynchburg | Campbell | Fishing Creek Quarry, owned by S. Patterson & Son. |
| 1 | Soapstone | Chula Station | Amelia | Old Dominion Stereotype Company. |
| 2 | Mica schist | Near Chain Bridge | Fauquier | Gilbert's. |
| 2 | Diabase | Near Catlett's Station | do | Fauquier Quarry, Charles Andrews proprictor. |
| 1 | Soapstone | Vallena | Buckingham | George Chambers. |
| 4 | Marble | Craigsville | Augusta | Coral Marble Company. |
| 2 | do | do | do | Craig's. |
| 2 | Diabase | Near Leesburg | Loudoun | East Bend Quarry, T. W. Edwards owner. |
| 1 | Marble | Near Greenwich | Rockbridge | From Daniel Fagan. |
| 2 | Limestone | Near the line of the Richmond and Allegheny Railroad. | do | Joseph G. Steele. |

*Localities from which specimens of building stones have been received, &c.*—Continued.

## NORTH CAROLINA.

| No. | Name of stone. | Town. | County. | Quarry. |
|---|---|---|---|---|
| 3 | Leopardite | Near Charlotte | Mecklenburgh | W. Y. Yates. |
| 1 | Soapstone | Nantahalah | Swain | Quarry on Nantahalah River. |

## GEORGIA.

| | | | | |
|---|---|---|---|---|
| 2 | Gneiss | Atlanta | Fulton | Patrick Lynch. |
| 2 | Granite | Stone Mountain Station, Atlanta (Ga.) Railroad. | De Kalb | Callahan & Welch. |
| 2 | Limestone | 12 miles from Chattanooga, on W. & R. Railroad. | Catoosa | Chickamauga Quarry. |
| 1 | Pagodite | 9 miles from Washington | Wilkes | From Charles W. Shepard. |

## FLORIDA.

| | | | | |
|---|---|---|---|---|
| 5 | Sandstone | Hawthorn | Alachua | C. A. Simmons. |

## ALABAMA.

| | | | | |
|---|---|---|---|---|
| 2 | Limestone | Near Dickson | Colbert | F. L. Fossick & Co. |
| 1 | Sandstone | Alabama & Gt. Southern R. R. | DeKalb | Collinsville Quarry. |

## KENTUCKY.

| | | | | |
|---|---|---|---|---|
| 2 | Limestone | Bowling Green | Warren | Belknap, Dumisneil & Co. |
| 2 | ....do | Louisville | Jefferson | City Quarry. |

## ARKANSAS.

| | | | | |
|---|---|---|---|---|
| 2 | Sandstone | Bald Knob | White | Bald Knob Quarry. |
| 1 | Limestone | | Marion | Quarry not stated (small). |
| 1 | ....do | Blansett | *Benton | From railroad cut. |

*This is probably Scott County.

## TEXAS.

| | | | | |
|---|---|---|---|---|
| 1 | Limestone | Near Austin | Travis | Judge Joseph Lee. |
| 2 | ....do | ......do | ....do | Banquas Quarry. |
| 2 | ....do | 8 miles north of Austin | ....do | Quarry not opened. |
| 2 | ....do | 9 miles from Austin (Duval Station). | ....do | Do. |
| 2 | ....do | Above Austin | ....do | Quarry not stated. |
| 2 | Sandstone | 9 miles southwest of Burnet | Burnet | Do |
| 2 | ....do | 2 miles east of Burnet | ....do | Do. |
| 2 | Limestone | 5 miles southwest of Burnet | ....do | Stony Creek. |
| 2 | ....do | 8 miles south of Burnet | ....do | Not stated. |
| 2 | Granite | 15 miles from Burnet | ....do | Backbone Valley. |
| 1 | ....do | 15 miles from Burnet | ....do | Quarry not stated. |
| 2 | Limestone | 10 miles above Austin | Travis | Quarry on Bull Creek. |
| 2 | Sandstone | 8 miles south of Burnet | Burnet | Quarry not stated. |
| 2 | ....do | Riverside | Walker | Do. |
| 2 | Limestone | 3 miles south of San Saba | San Saba | Dr. Gregg's quarry. |
| 2 | Dolomite | 2 miles southwest of Burnet | Burnet | Not stated. |
| 2 | Sandstone | Orange (station on Texas Pacific Railroad). | Eastland | Quarry of J. G. Searcey and R. B. Hubbard. |
| 1 | Limestone | 4 miles south of San Saba | San Saba | Dr. A. Gregg's quarry. |
| 1 | ....do | 8 miles south of San Saba | ....do | Do. |
| 1 | ... do | 3½ miles from San Saba | ....do | Do. |
| 1 | ....do | San Saba | ....do | Do. |
| 1 | ....do | 10 miles south of San Saba | ....do | Do. |
| 1 | ....do | San Saba | ....do | Do. |

*Localities from which specimens of building stone have been received, &c.*—Continued.

### DAKOTA.

| No. | Name of stone. | Town. | County. | Quarry. |
|---|---|---|---|---|
| 4 | Quartzite | Sioux Falls | Minnehaha | Phillips Quarry. |

### MONTANA.

| | | | | |
|---|---|---|---|---|
| 8 | Rhodochrosite | Walkersville | Deer Lodge | Quarry of Alice Gold and Silver Mining Company, Wm. E. Hall superintendent. |

### COLORADO.

| | | | | |
|---|---|---|---|---|
| 2 | Sandstone | Fort Collins | Larimer | Fort Collins Quarry. |
| 2 | Granite | Platte Cañon | Jefferson and Douglas. | Quarry of the government. |
| 2 | Sandstone | Near Cañon City | Fremont | Berlin Quarry. |
| 2 | Rhyolite | Castle Rock | Douglas | Girardair's Quarry. |
| 2 | Sandstone | Fort Collins | Larimer | Fort Collins Sandstone Quarry |
| 2 | ....do | Trinidad | Las Animas | Trinidad Quarry. |
| 2 | ....do | Coal Creek | Fremont | Coal Creek Quarry. |
| 2 | ....do | Arkansas River | ....do | Brandford Quarry. |
| 2 | Sandstone, red and white. | Sections 3 and 4, range 70 west | Jefferson | Welch Quarry. |
| 1 | Granite | Sections 19 and 20, township 3 south, range 70 west. | ....do | Pulcher's Gulch. |

### NEW MEXICO.

| | | | | |
|---|---|---|---|---|
| 3 | Sandstone | Near Santa Fé | Santa Fé | Santa Fé Quarry. |
| 1 | Rhyolite | Cienago, 15 miles southwest of Mesa, Santa Fé. | ....do | Quarry not stated. |
| 1 | Pumice-stone | 3 miles south of Santa Fé | ....do | Do. |

All collected by Major Stevenson.

### UTAH.

| | | | | |
|---|---|---|---|---|
| 4 | Marble | Paysons, 70 miles south of Salt Lake City. | | Quarry not stated. |
| 4 | Sandstone | Red Bub, 2½ miles east of Salt Lake City. | | Do. |
| 1 | Limestone | Paysons, 70 miles south of Salt Lake City. | | Do. |
| 2 | ....do | San Peter Valley | | Do. |
| 2 | Granite | Little Cotton Cañon | Near Salt Lake City. | Do. |

### NEVADA.

| | | | | |
|---|---|---|---|---|
| 4 | Trachyte | 3 miles east of Virginia City | Storey | John Barrett's. |
| 2 | Andesite | 2 miles west of Reno | Washoe | Fulton's Quarry. |
| 2 | Sandstone | Carson City | Ormsby | Carson Quarry. |

### IDAHO.

| | | | | |
|---|---|---|---|---|
| 2 | Sandstone | Boisé City | Ada | From William Thews. |

*Localities from which specimens of building stone have been received, &c.*—Continued.

### WASHINGTON TERRITORY.

| No. | Name of stone. | Town. | County. | Quarry. |
|---|---|---|---|---|
| 2 | Sandstone | Chuckanut Bay | Whatcom | C. Seidel & Co. |

### OREGON.

| | | | | |
|---|---|---|---|---|
| 4 | Sandstone | Near Oakland | Douglas | W. H. Leeper. |
| 2 | ....do | | Clackamas | Clackamas River Quarry, owned by W. Young. |

### WYOMING.

| | | | | |
|---|---|---|---|---|
| 2 | Granite | Dale Creek | | Quarry of G. Griffith. |

### CALIFORNIA.

| | | | | |
|---|---|---|---|---|
| 2 | Sandstone | Haywards | Alameda | Excelsior Quarry. |
| 2 | Tuff | Near Cordelia | Solano | Thomason Quarry. |
| 6 | Sandstone | Eight miles south of San José. | Santa Clara | Goodrich Quarry. |
| 2 | Limestone | Tehichipa | Kern | Small pieces; quarry not stated. |
| 2 | Sandstone | Livermore | Alameda | Livermore Quarry. |
| 2 | Basalt | Petaluma | Sonoma | Petaluma Quarry. |
| 2 | ....do | Bridgeport | Solano | Thomason's Quarry. |
| 1 | Limestone | Suisun City | ....do | Suisun Quarry. |
| 2 | ....do | Colfax | Placer | Colfax Quarry. |
| 2 | Marble | Twenty miles south of San Luis Obispo. | San Luis Obispo | San Luis Obispo Quarry. |
| 2 | Sandstone | Angel Island | Marin | Angel Island Quarry. |
| 2 | ....do | In range east of Alameda | Alameda | Quarry not stated. |
| 4 | Granite | Near Penryn | Placer | G. Griffith. |
| 2 | ....do | Near Rocklin | do | Do. |
| 3 | Marble, yellow | Town not stated | Kern | Mr. Luce (small). |
| 2 | ....do | Indian Diggings | El Dorado | Quarry not stated. |

[Proceedings United States National Museum, 1881. Appendix.]

# SMITHSONIAN INSTITUTION.

# UNITED STATES NATIONAL MUSEUM.

## No. 10.

## TWO LETTERS ON THE WORK OF THE NATIONAL MUSEUM.

### By BARNET PHILLIPS.

[Reprinted, by permission, from the New York Times.]

WASHINGTON, *February* 3, 1882.

As early as 1846, with the establishing of the Smithsonian Institution, Congress placed under its charge all objects of natural history, mineralogy, geology, and antiquities belonging to the United States. At that time, some thirty-six years ago, such collections as belonged to the country consisted almost entirely of objects gathered during the Wilkes explorations. While the Smithsonian Institution was in the act of crystallization, before it had taken definite shape, the Commissioner of Patents took care of such objects. When, in 1856, the central portion of the Smithsonian building was erected, the Wilkes collection and some few other objects were placed in its charge. The Wilkes collection may, however, be considered as having been that nucleus around which other objects belonging to the United States have been grouped when in their preservation the idea was sustained of presenting them for educational purposes. But with the increase of such collections which accompanied that great desire for information which has been one of the marked characteristics of a period included within the last twenty years, this augmentation has been marvelous. Those results of explorations, which the best brains in the country may have condensed in a page or a volume, have only been studied by means of tangible things, collected over vast areas, and finally brought to Washington. But more than this. In the industrial exhibitions in which this country has taken part, on some special occasions the government has been to large expense in the collecting of objects, as such exhibits were the very best representative ones of the day. These have been too valuable to be lost sight of, and have been preserved in their unity. At the same time, the United States has had presented to it a great accumulation of objects, both natural and manufactured, and among these gifts at the close of the Centennial Exhibition not less than twenty-five countries contributed their quota.

What to do with all this material became an important question. To hide all this light under a bushel would be to deprive the country of a fund of information obtainable nowhere else. The question of room space to exhibit them was a secondary one to that method, a philosophical one, which should govern the classification of such a museum. Immediately after the Centennial, when the public mind became more familiar with the great advantages derivable from a collective exhibition, the work of building up a national museum was actively taken up by Prof. Spencer F. Baird, at that time assistant-secretary of the Smithsonian Institution, by whose tireless energy the great natural history collections of the Institution had already been accumulated. There was an abundance of material already on hand, an accumulation of riches, but what was wanting was room to put it in.

Now, museums to-day differ in conception as much as does the writing of history from the plans in vogue fifty years ago. If Macaulay was among the first to draw the history of a people, with but slight allusions to kings and queens, and Green compiled the story of England, giving sovereigns but a passing notice, museums to-day, though they include in them such objects as are rare and precious which may have decked kings and queens, no longer seek for such matter exclusively. They no longer care for an audience which will simply gape and stare. It has grown as rapidly in the minds of those who establish museums and those who visit them that, although the pleasure to be derived from seeing a beautiful or a rare object is not to be made light of, the emotional instinct is not alone to be awakened. Imitative or inventive faculties must be stimulated. It is the fostering of one element, the practical one, that of positive object teaching, which all museums must strive for. The leaven must work in the most sluggish mind, and the instruction of the masses must be constantly undertaken. The South Kensington Museum has its highly æsthetic side, but it must be at one and the same time not only the school of the artist but of the artisan.

The National Museum in Washington, known perhaps for the first time as the locality where the late President's inauguration ball took place, is now open to the public. In its conception may be found one of the grandest of all schemes for instruction. Such a plan may be comprehended in a certain way when it is stated that it takes man for its central pivot, and around this is to revolve everything that man has done in the past or in the present in the world he lives in. Those depths which he has plumbed in the seas will contribute their quota, and where he has sought for light in the realms of heavenly space such slight information as he has gleaned will all be presented here. Not a science is there which man has studied which will not find its representative objects. This museum, besides, is to enter into every detail of human life, not only of the present but of the past, and is to be the custodian of its future. Its mission is to keep going on collecting for ever and ever. It will show to our great-great-grandchildren how their forefathers dressed, how they lived, cooked and ate their food, how they amused themselves, and 1992 will learn of the toys the children of 1882 played with. There is nothing, ever so trivial, which is thought unworthy of notice. The study of the evolution of anything is supposed to impart its lesson, and the spinning-wheel of a past time is to lead up by many stages to the more perfected mechanisms of to-day. Such a grand work as is prospected will, of course, take years to perfect. The originators of such a comprehensive scheme are perfectly conscious how short is life, and they know that the conclusion of their work is as far off as is eternity. Yet, for this task there are many men who are ready to labor on for years, conscious of the enormous advantages such a museum will present—not only in the next decade, but in the future. They are sanguine that in a comparatively short period this National Museum can be made attractive, and that the interest in it will increase in exact proportion with the instruction it imparts.

In describing the sources from whence already a large proportion of the collection has been derived, that coming in now from the census plays an important part. This census in some of its labors gave for results more than a dry catalogue, to be summed up by a row of figures. Tangible evidences of the resources of the country were required, and in some instances crude or manufactured objects were obtained. The mineral wealth of this country has been better understood by the last census than ever before. Thousands on thousands of specimens of building stone, collected all over the United States by the Census Bureau, are now deposited in this museum. Now, if these stones be followed out even briefly, they will explain the rationale, the thorough character, of an exhibition of this kind, which precise method is to be applied to every other substance.

Fragments of each stone lie alongside of the square block, the sides of which has been polished in various styles. A visitor at once sees how the stone works. If he is a builder of houses, a contractor who undertakes work to cost a million, or his workman, a certain quota of positive information is received. He who pays his money or is to receive it—both are taught. But this lot of stone is just on the commencement of its investigations. Fragments of it have been subjected to chemical analysis, and its exact chemical constituents are learned. The geologist has studied it. Then the microscopist has put it under his lens and has found out its structure. Finally, it has been subjected to the mechanician, who tried its strength and learned how much strain it would stand. Now we begin to appreciate how thorough and exhaustive is the method to which this specimen has been subjected. The visitor knows from the label, if he can read, locality, composition, and absolute value.

Simply looking at these objects to be exposed only as things, irrespective of natural characteristics, the process of study is to be the same throughout. Here are endless bottles of pharmaceutical preparations. Every one of these is being subjected to analysis. Each one will tell its own story, as where found, method of preparation, where derived, consumption, and, what is more, the cost will be indicated.

Now, it often happens that, in the multifarious business of the government, exact information is required in regard to substances on which duties are to be levied. It has heretofore been the habit to subject these substances to special experts. To-day, for already the working departments of the museum are in full blast, all these analyses can be, and are, actually being carried on.

As to that method of instruction, which must, however, be paramount to everything else, many new methods will be observed. If a certain product is to be exhibited as complete in itself, a requisite of such an exhibit will be that all the stages of such a manufactured article will be shown. Every step which can illustrate the perfected progress will be forthcoming. In the same case will be shown the very books which contain information on this particular substance, or, if not the books themselves, references to the volume and the page. A series, then, of labels, exhaustive in character, are to accompany all objects.

Materials as they are gathered serve at the same time as a basis for scientific research. It is not only for those who are satisfied with the commercial aspect of things in general that the museum serves a great purpose, but its collections react on the man of pure science. It is, then, in addition to being a museum of deposit or record, one of most active research. It can never be languid or wanting in interest, for the elements of life must exist from both without and within.

With such a scheme comes in the practical working of it. How, having to-day such a vast assemblage of objects, with an avalanche coming, how shall all these be exposed so "as to enable visitors to make their examinations with the least possible fatigue of eye and limb? How are objects to be labeled in the most concise and instructive way, so as to make the museum, as a whole, as beautiful and attractive as possible?"

Prof. G. Brown Goode, under whose care the practical work of the museum is being carried out, and who has given a great deal of attention to the classification, writes as follows: "The new building more than meets expectation. The illumination is perfect, the amount of space available for exhibition purposes is undoubtedly the maximum for a building of the size, and the disposition of the exhibition hall on a single level, directly upon the surface of the earth, proves to be of great importance to visitors and to those who have in hand the work of arranging the collections."

None but those thoroughly acquainted with the exigencies of a collection can appreciate the amount of thought necessary to construct such an apparently simple thing as a case. If it is to be substantial it must not be too bulky or overornamented, as one does not visit a museum to admire cabinet-work, but the objects it contains. It must be so arranged as to take in all the light. It must be quite air-tight, so as not to admit dust or moisture. With such a vast hall as that of the National Museum, where there are no partitions, the roof being held by square supports, the cases will mark the divisions. These cases must be so arranged as to be movable. In size they should bear a definite proportion to that of the hall. As there are to be lecture spaces left in the museum, these cases must be so built as to be readily transportable or interchangeable. In this way a lecturer may treat a subject, and at an hour's notice have himself surrounded by all the objects he may require for the demonstration of his lesson.

In the analysis of the plan of classification, the importance of which should never be forgotten, commencing with man, he is considered (1) as a zoological unit or species, (2) as grouped in tribes and races, (3) as an individual, as a representative man; and (4) in his vocations. Suppose, in his vocations, we take what are called the exploitative industries. The primary would be quarrying, mining, the ice industry, engineering, collection of field and fruit products, lumbering, hunting, fishing, and the butchers' industry. Now, in the secondary branches of vocations more complex would be agriculture, horticulture, forestry, landscape gardening, pecudiculture, domesticated animals, and acclimation. When we come to what are designated as elaborative industries and the arts, the list is very great. In studying the social relations of man enters telegraphy, government, laws, punishments, and with it war, with all the implements, offensive and defensive. With the intellectual and moral conditions of man come his superstitions, his crimes, errors, religious organizations and systems, his benevolent enterprises, charities, reformatory institutions, his amusements and sports, pictorial and plastic art, music, the drama, folk-lore, proverbs, traditions, literature, and science.

Endeavoring to show the enormity of this work only by its subdivisions, as illustrative of man's amusements, there are his toys and playthings. A philosophical analysis takes place. There are toys which attract one's senses—that of the eye, others the ear. A toy may combine both. Then there are mimetic toys, as dolls, miniatures of implements or useful objects. Now, fancy a series of toys extending back a century, or a row of cases filled with the dolls of both hemispheres. Smile as one may, still, to those who will study such things, wonderful are the lessons to be learned. Questions of kindred habit are often to be found in these minor topics, which tell the story of a race.

What a wonderful collection that would be illustrative of the drama, and how amazing would be the splendor of it. Think of the blaze of costumes and the leer of innumerable masks, for it would have to start, as a foundation, with the copies of those masks the Greeks used when Œdipus Tyrannus strode the stage. It has been said that nothing is to escape this vast collecting vortex. Here *in situ*, just as one enters the museum, is a case filled with Japanese masks, such as are used by Japanese actors for a religious drama of the fourteenth century. Away up stairs in one of the side storage-rooms littering the floor are a number of wooden masks yet unclassed. These come from the northwest coast of America. The veriest smatterer in archæological matters can at once see how striking is the resemblance between the contour and the grimace of the Japanese masks and those of the American Indian. The parallelism is complete. Are we to determine, then, at once from these indications that these two races are of one common origin? Was

America peopled from the east, or was Asia made populous from the west? Such a deduction from one single class of objects would be a most unsafe conclusion; but when in such a museum, at some future date, a great stock of material will be furnished, and a series of things brought in close juxtaposition, when the labors of thousands of collectors are fused, as it were, into one whole, then the anthropologist, ethnologist, and archæologist can apply their individual tests conjointly or separately, and much of the turbidity which exists to-day will be fined out, and a clearer and more limpid solution must come from it.

The building is a square one, with sides of 327 feet. It is surmounted by a cross and dome. Within there is a net area of 102,200 square feet, or 2.35 acres, the whole building being under one roof. On the main floor there are 17 halls, which communicate with wide and lofty archways, and there are 80,300 square feet of floor space. No less than 135 rooms are available for administrative functions, such as offices, &c. At present occupying these offices are those engaged in work on the geological survey, materia medica, analysis of foods, mineralogy, economic geology, entomology, chemistry, mammalogy, paleontology, herpetology, and photography. There are many more offices not yet occupied, but which will soon be filled with workers. The material is so vast that the task of studying it will never cease.

Taking up once more the considerations which have induced the government to undertake so great a task, those who have been its scientific advisers have fully brought to its notice the vast accumulation of material existing in Washington and throughout the country, and how, hidden away as it was, aside from the question of loss or dispersion, in its present condition it was utterly unavailable. When once such a work was undertaken, the exhibition of all the government collections, those which must necessarily be made in the future, it was shown, would find in this museum their natural resting place. It is by the power of generalization necessarily cosmical in its character that the great advance this nation is making will be then recorded. It is in a national museum that all specialists will come to study, and, as the attraction of the greater mass will be irresistible, this museum must in time absorb many lesser ones. Either by purchase or bequest, before long, minor collections will come to it, of all possible kinds, just as happens to-day to the British Museum.

It may take some years before some of those special branches of human work such as France, England, Germany, Spain, Russia, or Italy glories in will find their way to our National Museum, but it is simply a question of time. Save in this respect, it seems that in ten years this museum will have no rival. Its present is assured. For its future its plans are so intelligently conceived that it must increase in proportion with the growth of the country. Always remembering that there is no scientific fact discoverable, no matter how abstruse it seems, or to what field of study it belongs, which does not directly tend toward man's welfare, the vast practical benefits to be derived from this museum of research will be at once appreciated by our people. It is to be the living, tangible encyclopedia of all things and the great public instructor. Its purpose is to shape men's minds for vast projects and to keep pace with the rapid strides we are making. Washington may be a half a day's journey from the largest center in the United States, but in a few years students from all this continent will come to it to work out their tasks in the National Museum.

B. P.

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WASHINGTON, *February* 15, 1882.

Such interest as may have been awakened by the announcement that the country had established a great National Museum, which was now open to the public, was naturally accompanied by some curiosity as to the manner in which such a huge building shall be filled. It has been already stated that the government possesses a vast amount of superb material. There is not a special department in Washington which does not have hidden away collections which, though of great value, have never yet seen the light. Every year the museums abroad send over to this country photographic copies of what is finest in their collections, and, unfortunately, such excellent material has never been available because, before this, there never has been any way of showing it. Take, for instance, a case just now at point, those wonderful discoveries lately made at Thebes. Undoubtedly, before long, accurate pictures of these mummies, their coffins, the various objects surrounding them, will be made by the Egyptian Government, and will be distributed. Should any such come to us, at once they will find a place awaiting them in this museum. If only the desire was evinced by our government to have copies of the best antiques taken from the Louvre, the British, or the Berlin Museum, such plasters would be sent to us. An interchange of gifts between two governments is but an act of simple courtesy.

If we cannot exchange in return art subjects, at least we possess an endless number of objects which any museum in Europe would be glad to have. A duplicate of some antediluvian form which paleontologists like a Leidy, a Cope, or a Marsh had found and studied, is the equivalent in value of a cast of even the gods struggling with the giants. This possession of duplicates on the part of the museum will always be the means of increasing the collection with the choicest of foreign objects. But all these, the factors of a collective power, will be secondary to the action of the government itself. We have commercial agents all over the world, and, familiar as they must be with the countries they live in, if the objects of such a museum as the one at Washington were fully understood by those powers with whom our consuls are in relationship, products both of an industrial and artistic character could be turned into our museum. For many a year to come industrial exhibitions will be held not only at home, but abroad, and at the conclusion of such exhibitions there is always a large number of objects which could be collected without cost.

It should be remembered that the British Museum, magnificent as it is to-day, is not of so very old a date, and that the choicest portions of its collections have been presented to it. In the United States the era of collecting has only commenced. Thirty or forty years ago there was not enough wealth or leisure to permit of it. Men who for the sheer love of a thing devote a great deal of money and many years of their lives to the gathering together of the specimens belonging to a subject they have studied, are loth to lose even by death such associations as may have coupled their names with their collections. If such men know that the United States possessed a safe storehouse, where their collections would be forever preserved, this National Museum will in time fall heir to a great many objects of intrinsic value.

Our National Museum, as has been stated before, has but one object in view, and that is of an educational character, and it insists that there is nothing in this world which cannot instruct man, from a spade to a Greek bronze. It intends to undertake object lesson in its most extended manner. It offers no restrictions as to entrance. It even proposes, should ever the want become manifest, to open its vast arcades at night and to illuminate all its cases. Such vast conceptions as this museum entertains are not in the least impossible. They are not a step in advance of the times we live in, but are rather the corollary of our progress.

In describing as far as construction goes the physical characteristics of this museum, its spacious halls, its innumerable cases, its many workshops, these details are really secondary to that intangible thing the spirit which is to guide this institution, not only for to-day, but forever. It is, in a certain measure, an offshoot of the Smithsonian, though distinct from it. That small fund which a generous Englishman gave us a half-century ago has, under the management of the late Prof. Henry and the present Secretary, Prof. Spencer F. Baird, resulted in more good than any similar amount of money that ever was left as a bequest.

Commencing in a modest way, the Smithsonian Institution, founded for active research and the distribution of knowledge among mankind, has been forced to become in a certain way a collector. Its overcrowded rooms to-day show how rapid has been its accumulative power. One of the requisites of research being the ability to make comparisons, it would have been a waste of its powers had the Smithsonian shown any indifference to creating a museum within itself. In studying the earlier legislation directed toward the Smithsonian Institution, in which a variety of plans were proposed, just such a present museum was foreshadowed. But, most fortunately, there were wise heads at work when the Smithsonian was in its infancy. Such a load as that of a museum would have swamped it in its earlier days. The public men of fifty years ago foresaw that with time a vast museum might be developed; they were too intelligent to expect it to be forthcoming at once.

It does not, of course, behoove a great national enterprise of the character I have tried to describe to play the part of a solicitor, nor can it go from collector to collector and beg for contributions for its cases. Still, without directly asking such an enlightened mass of people as our own, it counts a great deal on private support. It believes that there are many people in this country—men of means, of intelligence—who, if they understood what is the aim of this museum—that of national education—they would gladly send to it their collections, or, knowing what particular class of objects the institution was desirous of securing, would come forward spontaneously and give it their aid.

That this is absolutely the case, and that such praiseworthy generosity does exist, I can myself testify to. Already some of the leading manufacturers of the country are sending forward collections of the objects they produce. The museum authorities exercise a choice in their selection, and deprecate anything that might assimilate the museum to an industrial exhibition, or, in other words, that one class of objects should be received in competition with another. What is to be taken by the museum is to be the best, and only one particular class of objects illustrative of a class of industry is to be accepted.

In the innumerable details necessary to render this museum effective and at the same time uniform, a type of case made under its direction is provided, and all the bottles, &c., or mountings, are provided by the museum. The work of arrangement and classification is already going on with great rapidity, and the publicity given to the museum is already bringing many visitors to it. Before long, in a series of cases will be arranged the musical instruments, the United States having fallen heir to a very curious collection coming from the East. The labor which is entailed on the officers of the museum is very heavy. Just as rapidly as possible new centers illustrating a particular subject are made, and with one case filled, others group themselves around it. The curators are amazed at the riches which have been stowed away in the vaults and lumber-rooms of the various departments in Washington, and there is every reason to suppose that when, in time, they can push their explorations other mines of wealth will be discovered. Many of these things have existed for the last twenty years, nailed up in boxes or tied up in portfolios, and not a human soul has been the wiser for then.

I have been obliged to repeat how immense is this plan, how wide is the ground it covers, how different are the subjects it includes, and, in order to make myself better understood, I give the list of the officers of the National Museum, with the various departments under their charge:

Spencer F. Baird, Secretary of the Smithsonian Institution, Director of the Museum; G. Brown Goode, Assistant Director, Curator, Department of Arts and Industries; Tarleton H. Bean, Curator, Department of Fishes; William H. Dall, Honorary Curator, Department of Mollusks; Frederick P. Dewey, Assistant, Department of Minerals and Economic Geology; James M. Flint, Honorary Curator, Section of Materia Medica; J. Howard Gore, Honorary Curator, Section of Foods; George W. Hawes, Curator, Department of Minerals and Economic Geology; Richard Rathbun, Curator, Department of Marine Invertebrates; Charles Rau, Curator, Department of Antiquities; Robert Ridgway, Curator, Department of Birds; Charles V. Riley, Honorary Curator, Department of Insects; R. W. Shufeldt, Honorary Curator, Section of Bird Skeletons; Robert E. C. Stearns, Assistant, Department of Mollusks; Frederick W. Taylor, Chemist; Frederick W. True, Librarian, Curator, Department of Mammals; Lester F. Ward, Honorary Curator, Department of Fossil Plants; Charles A. White, Curator, Department of Fossil Invertebrates; Henry C. Yarrow, Honorary Curator, Department of Reptiles; Stephen C. Brown, Registrar; Henry Horan, Superintendent of Buildings; Joseph Palmer, chief modeler; William T. Hornaday, chief taxidermist.

B. P.

[Proceedings United States National Museum, 1881. Appendix.]

## SMITHSONIAN INSTITUTION.

## UNITED STATES NATIONAL MUSEUM.

### No. 11.

# A PROVISIONAL CLASSIFICATION OF THE FOOD COLLECTIONS.

### By G. BROWN GOODE.

This list of foods here presented is known to be imperfect, both as regards form and completeness. It was prepared to aid in the formation and preliminary arrangement of the food collections in the National Museum, and to serve as a check-list for use in gathering material for the Museum. It is not based upon structural characters or even upon modes of preparation, convenience only having been sought. It is intended to include only such articles of food as are used by European nations. Criticism is requested.

Since the completion of this classification the curatorship of the food collections has been assumed by Prof. J. Howard Gore.

SMITHSONIAN INSTITUTION, *October* 1, 1881.

## ANALYSIS.

## FOOD SUBSTANCES.

### SYNOPSIS.

I.—MEATS. Fresh; Dried; Smoked; Pickled; Potted; Canned; In extract; Condensed. [Eggs and milk included.]

II.—FRUITS AND VEGETABLES. Fresh; Dried; Pickled [in vinegar or salt]. Preserved in sugar—[jams, marmalades, jellies, conserves, candied]; Canned; Condensed; In extract.

III.—NUTS AND NUT-LIKE PRODUCTS.

IV.—SPICES, CONDIMENTS, AND FLAVORING MATERIALS. Fresh; Dried [ground]; Pickled; Conserved; In extract.

V.—FARINACEOUS SUBSTANCES AND STARCHES. Cereals, pulse and starch tissues. Fresh; Dry; Crushed; Ground [meal, flour, bran]. Starch.

VI.—SUGARS. Raw materials; Molasses and sirups; Melados; Crystallized sugars; Refined sugars [crushed, pulverized, &c.].

VII.—BEVERAGES AND MATERIALS FOR BEVERAGES.
  OF ANIMAL ORIGIN. Milk. Preparation of honey.
  OF VEGETABLE ORIGIN. *Non-spirituous.* Infusions. Tea. Coffee. Cocoa, &c.
    *Spirituous.* Fermented.
      Malt liquors.
      Wines.
    Distilled.
    *Vinegars.*
  OF MINERAL ORIGIN. *Spring waters.* Artificial water.

VIII.—NARCOTICS.

IX.—OILS AND FATS. Vegetable oils. Butter. Lard.

X.—CHEESE.

## I.—MEATS.

### DOMESTICATED ANIMALS:

- Beef.
  Veal.
  - Pickled.
    - Corned beef.
    - Corned tongues.
  - Dried or smoked.
    - Smoked beef.
    - Smoked tongue.
    - Beef hams.
    - Bologna sausage.
    - Dried beef.
      - Chipped beef.
    - Pemmican.
  - Canned.
    - "Roast beef."
    - "Beef à la mode."
    - Canned corned beef.
    - "Deviled tongue."
    - "Bouillon."
    - "Ox-tail soup."
    - Mock turtle soup.
  - Special preparations.
    - "Extract of beef."
    - "Meat juice."
    - "Extractum carnis."
    - Desiccated beef.
    - Gelatine.
    - Calves' foot jelly.
    - Rennet.
    - Pepsin and its preparations.
    - Preparations of the brain.
    - Pickled tongues.
- Mutton.
  Lamb.
  - Canned.
    - "Roast mutton."
- Pork.
  - Pickled.
    - Salt pork.
    - Corned hams and shoulders.
  - Dried or smoked.
    - Hams.
    - Bacon.
    - Sausage.
  - Canned.
    - Ham.
    - "Deviled ham."
    - "Potted ham."
    - "Potted sausage."
    - "Boneless ham."

## I.—MEATS.

**DOMESTICATED ANIMALS:**

Horse.
Goat.
Kid.

**GAME:**

Venison.
Hare.
Rabbit.
Bear.

**POULTRY:**

| | | |
|---|---|---|
| Fowl. | Canned. | "Cocks' combs." |
| Capon. | | "Chicken." |
| | | "Roast chicken." |
| Turkey. | Canned. | "Roast turkey." |
| | | "Boneless turkey." |
| Goose. | Canned. | "Pâté de Foie Gras." |
| Duck. | | |
| Pea-fowl. | | |
| Guinea fowl. | | |
| Pheasant. | | |

**GAME BIRDS.** It is not thought necessary to specify these in this place.

**FISH AND SHELL-FISH.** Treated with the Fishery Collection.

Turtle soup, canned.

**EGGS:**

Fowl.
Turkey.
Duck.
Goose.
Guinea fowl.
Plover.
Gull.
Murre (California).
Turtle.
Shad-roe.
Mullet-roe, "Botargo."
Axayacat = Insect eggs.—Mexico.

## II.—FRUITS AND VEGETABLES.

| FRUITS. | Fresh. | Canned. | Conserved.<br>(Jams.)<br>(Marmalades.) | Dried. |
|---|---|---|---|---|
| Apples. | * | * | *<br>Jelly.<br>Butter. | ** |

## II.—FRUITS AND VEGETABLES

| FRUITS. | Fresh. | Canned. | Conversed. | Dried. |
|---|---|---|---|---|
| Apples, Crab. | * | | Jelly. | |
| Apricots. | * | * | * | |
| Avocado pear. | | | | |
| Bananas, | * | | | * |
| Barberries. | | | | |
| Blackberries. | * | * | * | * |
| Canteloupes. *See* Muskmelons. | | | | |
| Cherries. | * | * | * | * |
| “Birambi”. | | | * Pickled. | (** desiccated). |
| Citrons. | | | * | * |
| Cocoanuts. (Green.)* | | | | ** |
| Cranberries. | * | | * | |
| Currants. | * | * | * | |
| “ Black. | * | | (“Dried currants.” *See* Grapes.) | |
| Damsons. *See* Plums. | | | | |
| Dates. | | | | * |
| Elderberries. | | | | |
| Figs. | * | | | * |
| Ginger root. | | | * | |
| Gooseberries. | * | * | * | |
| Grape-Fruit. *See* Shaddocks. | | | | |
| Grapes. | * | | * | Raisins.<br>“Beshmet.”<br>“Currants.” |
| Green gages. *See* Plums. | | | | |
| Guavas. | | | * | |
| Huckleberries. *See* Whortleberries. | | | | |
| Jujube. | | | * | |
| Lemons. | * | | * | |
| Loquats, or Japanese plums. | | | | |
| Limes. | * | | (Pickled). | |
| Mandrake, or May-apple, fresh. | | | | |
| Mulberries. | * | | | |
| Muskmelons. | * | | | |
| Nectarines. | * | | | |
| Olives. | | | (Pickled). | |
| Oranges. | * | | | |
| Pawpaws (American). | * | | | |
| Peaches. | * | * | * | * |
| Peach-blossoms. | | | * | |
| Pears. | * | * | * | * |
| Persimmons. | * | | | |

## II.—FRUITS AND VEGETABLES.

| FRUITS. | Fresh. | Canned. | Conserved. | Dried. |
|---|---|---|---|---|
| Pine-apples. | * | * | * | |
| Plantains. | * | | | |
| Plums. | * | * | * | * |
| Beach-plums. | | | | |
| Green gages. | * | * | | |
| Damsons. | * | * | | |
| Prunes. | | | | |
| Prunellos. | | | | * |
| Pomegranates. | * | | | |
| Pumpkins. | * | | | * |
| Prickly pears (cactus). | * | | | |
| Quinces. | * | | Jelly. | |
| Raspberries. | * | * | * | * |
| Rose-leaves. | | | * | |
| Strawberries. | * | * | * | |
| Service-berries. | | | | |
| Shaddocks. | * | | | |
| Tamarinds. | | | * | |
| Tomatoes. | * | (Canned as | * | |
| " Cherry, or "Cape Gooseberries." | * | vegetables). | | |
| Watermelons. | * | | | |
| Whortleberries. | * | | | |

VEGETABLES:

**Preliminary classification.**

**A. Fruits and Nuts.**
**B. Pulse and Cereals.**
**C. Sprouts and Leaves.**
**D. Buds and Flowers.**
**E. Roots and Tubers.**
**F. Cryptogamic Plants.**

NOTE.—The group to which each vegetable belongs is indicated by one of the above letters.

| | Fresh. | Canned. | Pickled. | Dried. |
|---|---|---|---|---|
| Achias v. Bamboo. | | | | |
| Apples. (A). | * | | | |
| Artichokes. (D). | * | | | |
| Asparagus. (C). | * | * | | |
| " (French). | | * | | |
| Badderlocks. (C). | | | | |
| Bamboo. (C). | | | | |
| Beans. (B). | * | * | | |
| Butter beans. | * | * | | |
| Lima beans. | * | * | | |
| Flageolets. | * | * | | |

## II.—FRUITS AND VEGETABLES.

### VEGETABLES:

| | | | | |
|---|---|---|---|---|
| Haricots=string-beans=snap-beans=bush-beans=kidney beans. | | * | | |
| Horse-beans. | | | | |
| Lentils. | | | | |
| Beets. (E). | * | | * | |
| Beet-sprouts. | * (C). | | | |
| Broccoli. (C). | | | | |
| Brussels sprouts. (C). | | | | |
| Bore-cole. *See* Kale. | | | | |
| Cabbage. (C). | * | | "Sauerkraut." | |
| Cassava. (C). | * | | | |
| Capers. (D). | | | * | |
| Carrots. (E). | * | | | |
| Cauliflower. (D). | * | | * | |
| Celery. (C). | | | | |
| Celeriat. (C). | | | | |
| Cardon. (C). | | | | |
| Chervil (*Cherophyllum bullosum*). (C and E). | | | | |
| Cepes. | | | * | |
| Chives. (E). | * | | | |
| Corn (green). (B). | * | * | * | * |
| Corn salad. (C). | | | | |
| Cresses (C). *See* Water-cresses. | | | | |
| Cucumbers. (A). | * | | * | |
| Gherkins. | | | * | |
| Cymblings. *See* Symblims and Squash. | | | | |
| Dandelion sprouts. | * (C). | | | |
| Dulse. (C). | * | | | * |
| Egg-plant. (E). | * | | | |
| Elder shoots (pickled to imitate bamboo). | | | | |
| Endive. (C). | * | | | |
| Flageolets. *See* Beans. | | | | |
| Gherkins. *See* Cucumbers. | | | | |
| Gumbo. *See* Ochra. | | | | |
| Haricots. *See* Beans. | | | | |
| Hops. *See* Yeast. | | | | |
| Kale. (C). | | | | |
| Kohl Rabbi. (C). | * | | | |
| Lamb-lettuce. *See* Corn-salad. | | | | |
| Laver. (C). | | | | |
| Jerusalem artichokes. (E). | | | * | |
| Lettuce. (C). | * | | | |
| Lentils. *See* Beans. | | | | |
| Mangold-wurzel. (E). | * | | | |

## II.—FRUITS AND VEGETABLES.

### VEGETABLES.

| | | | | |
|---|---|---|---|---|
| Martynia. (A). | | | * | |
| Milkweed sprouts. | * (C). | | | |
| Mushrooms. (F). | * | * | | |
| Mustard leaves. (C). | | | | |
| Nasturtiums. (C, D). | * | | * | |
| Okra, or Ochra. (A). | * | * | * | |
| Olives. (A). | | | * | |
| Onions. (B). | * | | * | |
| Orache=Mountain spinach (C), fresh. | | | | |
| Parsley. (C). | | | | |
| Parsnips. (E). | * | | | |
| Pawpaw—Tropical (A), fresh. | | | | |
| Peas (green). (B). | * | | | |
| French peas. | | * | | |
| Pepper-grass. (C). | | | | |
| Peppers. (A). | * | | * | |
| Plantains. (A). | * | | | |
| Poke stalks. (C). | * | | | |
| Potatoes. (E). | * | | | |
| Sweet. (E). | * | | | |
| Yams. | | | | |
| Chinese. | * | | | |
| Purslane or pusley. (C). | | | | |
| Pumpkins. (A). | * | | | * |
| Radish-pods. (A). | | | * | |
| Radishes. (E). | * | | | |
| Rape. (C). | | | | |
| Rhubarb. (C). | * | * | | |
| Ruta-baga. (E). | * | | | |
| Scorzonera. (E). | | | | |
| Salsify. (E). | * | | | |
| Samphire. (C). | | | * | |
| Sorrel. (C). | * | | | |
| Spinach. (C). | * | | | |
| Savoy Cabbage. *See* Cabbage. | | | | |
| Scolymus=Spanish Oyster-plant (E), fresh. | | | | |
| Squashes. (A). | * | | | * |
| Symblims. | * | | | |
| Sea kale. (C). | | | | |
| Skirret (*Sium sisarum*) (E), fresh. | | | | |
| Sprouts. (C). | * | | | |
| Symblims. *See* Squash. | | | | |
| Tomatoes. (A). | * | * | * | |
| | | | Catsup. | |

## II.—FRUITS AND VEGETABLES.

VEGETABLES.

Tuckahoe. (F). *
Turnips. (E). *
Truffles. (F). *
Vegetable marrow (A), fresh.
Vegetable oyster. *See* Salsify.
Water-cresses. *
Walnuts. *
Yams. *

Catsup.

Mixed.

Succotash. * *
Chow-chow, Piccalilli, &c. *

## III.—NUTS AND NUT-LIKE SUBSTANCES.

**Preliminary classification.**

**A. True Nuts.**
**B. Pits.**
**C. Cone-seeds.**
**D. Tubers.**

Almonds, sweet. (B). "Jordan." Valentia."
" bitter. (B).
Beech-nuts. (A).
"Belotes." A. [Acorns of *Quercus gramuntta* and *Q. castagnara*], eaten in Spain and Italy.
Black walnuts. (A).
Brazil nuts. (A).
Butter-nuts. (A).
Cashew-nuts.
Chestnuts. (A).
" American.
" French.
" Italian.
Chinquapins. (A).
Cocoanuts. (A).
Filberts. *See* Hazel-nuts.
Gouba peas. *See* Peanuts.
Ground-nuts. *See* Peanuts.
Hazel-nuts. (A).
Filberts.
Hickory-nuts. (A). *
Peanuts. (D).
Pecans. (A).
Pine-nuts, (Piñons). (C).
Pistachio nuts. (B).
Walnuts. (A).

## IV.—SPICES, CONDIMENTS, AND FLAVORING MATERIALS.

**Preliminary classification.**

**A. Berries and Fruits, and Seeds.**
**B. Buds.**
**C. Leaves.**
**D. Barks and Rinds.**
**E. Roots.**
**F. Minerals.**
**G. Gum.**
**H. "Fish."**

Allspice. (A).
Anchovies. (H.)
Almonds. (A). (Burnt).
Alum. (F).
Anatto. Coloring substance.
Angelica.
Anise seed. (A).
Asafœtida. (G).
Basil. (C).
Bicarbonate of Soda. (F). (Baking powder.)
Borage. (C).
Burnet.
Calamus root. (E).
Capers. (B).
Capsicum. (A). Cayenne pepper.
Caraway seeds. (A).
Cardamum seeds. (A).
Cassia buds. (B).
Celery seeds. (A). Celery salt.
Cassia bark, (D), or bastard cinnamon.
Cayenne pepper. *See* Chillies.
Chicory. (E).
Chillies. (A).
Chocolate. *See* Cocoa.
Cinnamon. (D).
Citron rind. (D).
Cloves. (B).
Cocoa. (A).
Coffee. (A).
Coriander seed. (A).
Cream of Tartar. (F). (Baking powder.)
Dill.
Fennel seeds. (A).
Garlic. (E).
Ginger. (E). Calcutta.
African.

## IV.—SPICES, CONDIMENTS, AND FLAVORING MATERIALS.

**Preliminary classification.**

Horseradish. (E).
Leeks. (E).
Long pepper. (A).
Liquorice. (E).
Lemon rind. (D).
Mace. (D). *See* Nutmeg.
Mustard. (A).
Nasturtium seeds. (A).
Nutmegs. (A).
Onions. (B).
Orange rind. (D).
Pepper, white. (A).
" black. (A).
Peppermint. (C).
Pimento. *See* Allspice.
Rocambole. (E).
Saffron. (Coloring material.)
Sage. (C).
Salt. (F).
Sarsaparilla. (E).
Shallot. (E).
Sassafras. (D).
Sodium bicarbonate v. Bicarb. soda.
Star Anise seeds. (A). "Curry powder."
Summer savory. (C).
Sweet marjoram. (C).
Tarragon. (C).
Tartaric acid. (Baking powder.)
Thyme. (C).
Turmeric. (E.)
Vanilla. (A).
Wintergreen. (C). Checkerberry.
Yeast. (F). Compressed yeast, &c.

"Snails" (Medecago orbicularis).
"Caterpillars" (Spupiorus sp).
"Worms" (Astragulus hamosus).
} Pods used for garnishing salads "to excite surprise or curiosity among the guests at a table."

## MINERAL SUBSTANCES USED IN ADULTERATION.

Barytes.
Felspar.
Steatite.
Silex.

## V.—FARINACEOUS AND STARCHY SUBSTANCES.

**Preliminary classification.**

- **A. Cereals.**
- **B. Nuts.**
- **C. Pulse.**
- **D. Leaves.**
- **E. Roots.**
- **F. Stem and Pith.**

| | |
|---|---|
| Achira E. (Spec. of Canna). | Achira Starch. |
| Arrowroot (E). | Arrowroot starch. |
| Barley (A). | Pearl barley. |
| | Barley meal. |
| | Crushed barley. |
| | Barley flour. |
| Beans (C). | Dried beans. |
| | Split beans. |
| | Bean meal. |
| Buckwheat. | Buckwheat flour. |
| Birds'-nests. | |
| Carrigeen. *See* Irish moss. | |
| Carob, or St. John's bread. (C). | |
| Cassava. *See* Tapioca. | |
| Chestnut. (A). | Chestnut meal. |
| | "Apilada"= Dry and peeled chestnuts. |
| | Chestnut Starch. |
| Chick-pea. (C). | |
| Coontie. (F). | Coontie starch. |
| Corn (A). | Dry corn. |
| Sugar corn. | |
| Yellow corn. | Hulled corn, (prepared with lye). |
| White corn. | Hominy, or cracked corn. |
| Pop-corn, etc. | Grits. |
| | Samp, or fine hominy. |
| | Corn meal. |
| | Pop-corn flour, "Snow-flake." |
| | Corn-starch. |
| | Pop-corn. |
| | Corn bread of all kinds. |
| Haricots. (C). | Dry haricots. |
| Iceland moss. | |
| Irish moss. (D). | Irish moss. |
| | "Sea-moss farine." |
| Lentils. (C). | Dry lentils. |
| Millet. (A). | |

## V.—FARINACEOUS AND STARCHY SUBSTANCES.

| | | |
|---|---|---|
| Oats. (A). | | Dry oats. |
| | | Oaten grits. |
| | | Oatmeal. (Fine and coarse.) |
| | | Oatmeal bread, crackers, etc. |
| Pease. (C). | | Dry pease. |
| Plantain meal. | | Split pease. |
| Portland Sago. (E). | | Pea meal. |
| Potatoes. (E). | | Potato starch. |
| | | "Potato sago. |
| Rice. | "American." (A). | "Paddy." |
| | "Arracan." | |
| | "Akyab." | Rice. |
| | "Bassein." | |
| | "Bengal." | Rice meal. |
| | "Brazil." | |
| | "Ballam." | Rice starch. |
| | "Java." | |
| | "Madras." | |
| | "Moulmain." | |
| | "Patna." | |
| | "Rangoon." | |
| | "Sargon." | |
| | "Siam." | |
| Rye. (A). | | Rye meal. |
| | | Rye flour. |
| | | Rye bran. |
| | | Rye bread. |
| Sago. (F). | | Sago starch. |
| Sorghum. (A). | | Sorghum flour. |
| Tapioca. (E). | "Cassava." | "Flake tapioca." |
| | "Rio." | "Pearl tapioca." |
| | "Bahia." | "Mandioca." |
| Tous le Mois (E). | | Tous le Mois starch. |
| Wheat. (A). | | Pearl wheat. |
| | | Wheat grits. |
| | | Steam-cooked wheat grits. |
| | | Meal. Flour. |
| | | Bran. Middlings. |
| | | Pollard. |
| | | Graham flour. |
| | | New process flour. |
| | | Whole wheat flour. |
| | | Starch. |

## V.—FARINACEOUS AND STARCHY SUBSTANCES.

"Corn starch."
Farina.
"Manioca."
Diabetic flour. (Bran.)
Dyspeptic flour. (Gluten.)
Infants' food.
  "Imperial granum," etc.
"Ridges food."
Bread, leavened and unleavened.
Pastry.
Crackers. Milk. Butter.
  Water. Soda.
Maccaroni and vermicelli.

## VI.—SUGARS.

Cane sugar. Muscovado. Melado.
  Molasses. "Porto Rico." "New Orleans." "Santa Cruz."
  Sirup. "Sugar-house," etc.
  Brown sugar.
  Loaf sugar. [Crushed, granulated, cubes, powdered.]
  Confectioner's sugar. Barley sugar.
  Rock candy. Caramels.
  *Confectionery and candy of all kinds.*
    Colorings for candy.
Corn sugar.
Sorghum sugar.
Beet sugar. Mangold-wurzel sugar.
Birch, poplar, oak and ash sugars.
"Jaggary," or palm sugar.
Date sugar.
Maple sugar. Sirup. Molasses.
Grape sugar. "Confectioners'." "Brewers'."
Glucose.
Honey.
Liquorice.
Sarcocoll.

## VII.—BEVERAGES AND MATERIALS FOR BEVERAGES.

OF ANIMAL ORIGIN. Milk. Whey. Buttermilk. Koumiss. Preparations of honey. "Mead." "Metheglin." [Bouillons and soups.]

## VII.—BEVERAGES AND MATERIALS FOR BEVERAGES.

OF VEGETABLE ORIGIN. Infusions and materials for infusions.

- Tea.
  - Green.
    - Imperial.
    - Gunpowder.
      - Ping Suey Gunpowder.
    - Hyson.
      - Young Hyson.
    - Twankay.
    - Japan.
  - Black.
    - Pekoe.
      - Orange-flower Pekoe.
      - Flowery Pekoe.
      - Pekoe.
      - Broken Pekoe.
      - Pekoe dust.
      - Pekoe Souchong.
    - “Caper.”
    - Oolong.
    - Pouchong.
    - Souchong.
    - Congou.
    - Bohea.
  - American.
  - Leaves used in adulterating tea, or as substitutes:
    - “Swiss tea.”
    - Arabian tea.
    - “Bosjes or Boer tea.”
    - “Hottentot tea.”
    - Bencoolen tea.
    - “Mountain tea.”
    - “Lime tea.”
    - “Labrador tea.”
    - “Kola tea.”
    - “Corossal tea.”
    - “Sumatra tea.”
  - Maté, or Paraguay tea (Ilex paraguayensis).
  - Yupon, or American tea (Ilex cassini).
  - Appalachian tea (leaves of Viburnum cassinoides).
  - Sweet fern.
  - Abyssinian tea (leaves of Catha edulis), used by Arabs.
- Coffee.
  - Arabian.
    - “Mocha.”
    - “Bourbon.”
    - “Cazengo.” “Aconge.” } African.
    - Liberian.

## VII.—BEVERAGES AND MATERIALS FOR BEVERAGES.

### OF VEGETABLE ORIGIN.

- East Indian.
  - "Java."
    - "Nilghery."
  - "Ceylon."
    - "Mysore."
    - "Bombay."
  - "East Indian."
    - "Madras."
  - "Singapore."
    - "Cochin."
  - "Macassar."
- American.
  - "Laguayra." (Trillado and Deszerado).
  - "Puerto Cabello."
  - "Maracaibo."
  - "Savanilla."
  - "Curaçao."
  - "Costa Rica."
  - "Guatemala."
  - "Nicaragua."
  - "Mexican."
  - "Ecuador."
  - "Porto Rico."
  - "Jamaica."
  - "Cuba."
  - "Santo Domingo."
  - "Rio."
  - "Bahia."
  - "Ceara."
  - "Peaberry."

- "Bedagosa"—Brazilian substitute for coffee.
- Chicory.
- Amande de Terre.
- Guarana bread.
- Date-stone coffee—"Melilotine coffee."
- Cocoa.
  - Cocoa.
  - Cocoa shells.
    - "Cocoa tea."
  - Chocolate.
  - "Broma."

JUICES OF FRUITS AND OTHER SUBSTANCES:

- Angostura bitters.
- Lime-juice.
- Fruit sirups and vinegars.
- *Root beer.* Sarsaparilla. Spruce beer.

SPIRITUOUS LIQUORS:

- *Malt liquors.*
  - White beer.
  - Lager beer.
  - Bock beer.

## VII.—BEVERAGES AND MATERIALS FOR BEVERAGES.

### SPIRITUOUS LIQUORS.

- *Malt liquors.*
  - Ale. Bitter beer.
  - Stout.
  - Porter.
  - *Yeast.* Hops.
- *Wines.*
  - Rhine wines, &c.
  - Mosel wines, &c.
  - Austrian wines.
  - Hungarian wines.
  - Bordeaux wines.
  - Burgundy wines.
  - Champagnes.
  - Muscat wines.
  - Spanish wines. Sherry. Adelantadillo.
    - Malaga.
  - Portuguese wines. Port.
    - Madeira.
  - Italian wines. Marsala, etc.
  - Greek wines.
  - American wines, &c.
- *Fruit wines.*
  - Blackberry wine.
  - Currant wine.
  - Orange wine.
  - Aurantra wine—Sardinia and India.
  - Raspberry wine.
  - Elderberry wine.
- *Cider.*
  - Crab-apple cider. Pear cider. Perry.
  - Birch wine.
  - "Toddy."
- *Distilled liquors.*
  - Alcohol.
  - Whisky. Corn whisky. Pulque, Mexican agave liquor.
    - Rye whisky.
    - Potato whisky.
    - "Hoochenoo."
  - Rum.
  - Brandy. Cognac.
  - Arrack ("Toddy").
  - Gin.
  - Apple-jack.

## VII.—BEVERAGES AND MATERIALS FOR BEVERAGES.

SPIRITUOUS LIQUORS.
- Liqueurs and cordials.
    - Maraschino.
    - Curaçao.
    - Rosoglio.
    - Aquavita.
    - Absinthe.
    - Angostura.
    - Anisette.
    - Chartreuse.
- Vinegar.
    - Cider vinegar.
    - Wine vinegar.
        - Tarragon vinegar.
    - Sulphuric acid vinegar.
    - Acetic acid vinegar.

MINERAL BEVERAGES (Natural and artificial):
- Sulphur waters.
- Aerated waters.
    - Soda water.
    - Ginger beer.
- Iron waters (Chalybeate).
- Cathartic waters.
- Lithia water.

## VIII.—NARCOTICS AND MASTICATORIES.

- Opium.
- Chloral.
- Tobacco.
    - Leaves.
    - Fine-cut.
    - Powdered.
    - Plug tobacco.
    - Snuff.
    - Cigars.
    - Cigarettes.

Tobacco to be shown by localities.
- "Asarabacca"—a Cephalic snuff.
- Hascheesch. Hyoscyamus.
- Coca—"Acuelico."
- Betel nuts and betel leaves, used with shell lime.
- "Akarakarum"—India.
- Chewing-gums.

## IX.—OILS AND FATS.

- Olive oil.
- Cotton-seed oil.
- Butter.
- Lard.
- Oleomargarine.

## IX.—OILS AND FATS.

Beech-nut oil, used in France as a substitute for butter.
Cocoa-butter.
Turtle oil.

## X.—CHEESE.

American.
"Parmesan." "Strachino."
"Stilton."
"Cheshire."
"Edam." "Rahmkase." "Texelkase."
"Gruyere." "Schweitzer," or Swiss. "Krauterkase."
"Neufchatel." Cream cheese. "Sage cheese."
"Pine-apple."
"Fromage de Brie."
"Gouda."
"Leyden."
"Limburger."
"Muenstar."
"Roquefort."
"Cheddar."
"Menauta"="Camembert," canned.
"Cottage cheese"="Schmierkase."
"Pot-cheese."
Rennet. Liquid rennet. Pepsin.

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  Rind .... 9
Cloves .... 9
Cocks' combs, canned .... 3
Cocoa .... 9
  Butter .... 17
  Shells .... 15
  Nuts .... 4, 8
  Tea .... 15
Coffee .... 9, 14
  American .... 15
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  East Indian .... 15
Cognac .... 16
Coloring material .... 10
Comas root ....
Condiments .... 9, 10
Coontie .... 11
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Cordials .... 17
Coriander seeds .... 9
Corn .... 11
  Cracked .... 11
  Dry .... 11
  Green .... 6
  Hulled .... 11
  Pop .... 11
  Sugar .... 11
  White .... 11
  Yellow .... 11
Corn bread .... 11
  Meal .... 11
  Starch .... 11
Cottonseed oil .... 17
Crackers .... 13
  Butter, milk, soda .... 13
  Water .... 13
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Curry powder .... 10
Damsons .... 4, 5
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Eggs .... 3
  Duck's .... 3
  Goose .... 3
  Guinea fowl .... 3
  Gull .... 3
  Murre .... 3
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  Turkey .... 3
  Turtle .... 3
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Extractum carnis .... 2
Farina .... 13
Farinaceous substances .... 11
Felspar .... 10
Fennel seeds .... 9
Figs .... 4
Filberts .... 8
Fish .... 3
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Flageolets .... 6
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Flour .... 12
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Kohl Rabbi 6
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Lard 17
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Meat juices 2
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Mineral beverages, natural 17
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Molasses 13
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Mushrooms 7
Muskmelons 4
Mustard 10
Mutton 2
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Narcotics 17
Nasturtiums 7
Nectarines 4
Nutmegs 10
Nuts, etc 8
Oats 12
  Dry 12
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  Bread 12
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Rum 16
Rye 12
  Bran 12
  Bread 12
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Sage 10
Sago 12
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Salsify 7
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Sarsaparilla 10
Sassafras 10
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Silex 10
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Soups 14
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Spices, condiments, etc 9
Spinach 7
Sprouts 7
Squashes 7
St. John's bread 11
Star anise seed 10
Starches 13
  Steatite 10
Stout 16
Strawberries 5
Succotash 8
Sugars 13
  Beet 13
  Cane 13
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Tarragon 10
Tea, American 14
  Black 14
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Thyme 10
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- Tous le mois, 12
  - Starch, 12
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- Tuckahoe, 8
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- Vinegars—
  - Cider, 17
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  - Tarragon, 17
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  - Black, 8
- Watercresses, 8
- Watermelons, 4
- Wheat, 12
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- Whey, 14
- Whisky, 16
  - Corn, 16
  - Hoochenoo, 16
  - Potato, 16
  - Rye, 16
- Whortleberries, 5
- Wines, 16
- Wintergreen, 10
- Yams, 8
- Yeast, 10, 16
  - Compressed, 10

[Proceedings United States National Museum. Appendix.]

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

No. 12.

# CLASSIFICATION OF THE COLLECTION TO ILLUSTRATE THE ART OF TAXIDERMY. (58, B. 1.)*

By WILLIAM T. HORNADAY.

## Tools, Materials, and Accessories.

A. Tools used by taxidermists.
  (1) For skinning animals.
  (2) For cleaning skins.
  (3) For carving wooden skulls, bones, etc.
  (4) For drilling and boring.
  (5) In building manikins.
  (6) For inserting fibrous filling-materials.
  (7) In setting eyes and modeling generally.
B. Materials used.
  (1) Preservatives and protectives for skins.
  (2) Iron supports.
  (3) Fibrous filling-materials.
  (4) Plastic filling-materials.
  (5) Materials for repairing and restoring.
  (6) Specimens of repairing work.
  (7) Coloring-materials and appliances.
  (8) Materials for removing grease, dirt, and blood from feathers and hair.
C. Accessories.
  (1) Glass eyes.
  (2) Artificial leaves.
  (3) Artificial ground-work: water, ice, snow, rock, and wood.
  (4) Artificial perches, trees, and pedestals.

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* Division VIII. Intellectual Occupations of Mankind.
Class 58. The Graphic, Plastic, and Decorative Arts.
Section B. Taxidermy, and animal modeling.
Subsection 1. Taxidermy.

### PROCESSES IN TAXIDERMY.

D. Dry skins of animals not mounted.
  (1) Mammals.
  (2) Birds.
  (3) Reptiles.
  (4) Fishes.
E. Models to show the processes of relaxing dry skins.
F. Sets of models illustrating the processes of mounting.
  (1) Small mammals.
  (2) Large mammals.
  (3) Small birds.
  (4) Large birds.
  (5) Serpents.
  (6) Fishes, entire and in medallion.
  (7) Heads of mammals.

### EXAMPLES OF TAXIDERMIC WORKMANSHIP.

G. Mammals, small, medium, and large.
H. Birds, small, medium, and large.
I. Reptiles, small, medium, and large.
J. Fishes, small, medium, and large.
K. Artistic groups of the above, in variety.
L. Grotesque groups, in variety.
M. Animals grotesquely mounted.
N. Ornamental or decorative taxidermy.
  (1) Heads on shields and in cases.
  (2) Screens (with head and neck of bird, or entire subject).
  (3) Medallions, large and small.
  (4) Panel-pieces on shields and in cases.
  (5) Rugs, with head mounted.
  (6) Hat-birds and birds' heads.
  (7) Other ornamental or decorative work.
O. Photographs of first-class work of all kinds, by representative taxidermists.

[Proceedings United States National Museum, 1881. Appendix.]

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

No. 13.

# OUTLINE OF A SCHEME OF MUSEUM CLASSIFICATION.

**By G. BROWN GOODE.**

WASHINGTON, *April* 10, 1882.

Sir: I submit herewith the outline of a plan of classification for use in the arrangement of specimens and other materials in this Museum. Should the form of this outline stand the test of criticism, I purpose at an early date to submit a more detailed scheme of classification, sufficiently minute in its subdivisions to be made useful in the assorting and distribution of the immense quantities of objects now stored in the Museum buildings.

In explanation of the wide scope of this effort, I have only to remark that it has been my ambition to frame a classification so broad that a place shall be provided for every object which has a name, so that should the limits of our work, in future, be extended in any direction whatever, this may be done in accordance with a uniform plan.

I think I may safely say that the Museum has already in its possession considerable collections in every class named in the schedule, particularly among the materials obtained from the aborigines of America.

I am, sir, yours respectfully,

G. BROWN GOODE.

Professor SPENCER F. BAIRD,
*Director United States National Museum.*

## OUTLINE OF A SCHEME OF MUSEUM CLASSIFICATION.

### ANALYSIS.

| Divisions. | | Classes. |
|---|---|---|
| I. | Mankind | 1– 3 |
| II. | The Earth as Man's Abode | 4–10 |
| III. | Natural Resources | 11–15 |
| IV. | The Exploitative Industries | 16–20 |
| V. | The Elaborative Industries | 21–38 |
| VI. | Ultimate Products and their Utilization | 39–47 |
| VII. | Social Relations of Mankind | 48–54 |
| VIII. | Intellectual Occupations of Mankind | 55–64 |

## OUTLINE.

| | |
|---|---|
| I.—MANKIND. | ANTHROPOLOGY. |
| 1. Man as a zoological unit | Somatology and psychology. |
| 2. Man, grouped in peoples or races | (*a*) Races of men, physical characters; (*b*) linguistic characters; (*c*) art and industrial characters; (*d*) ethnogeny; (*e*) geographical distribution of races; (*f*) history, prehistoric and recent, etc. |
| 3. Man, in individual manifestations. | Representative men: Biography. |
| II.—THE EARTH AS MAN'S ABODE. | HEXIOLOGY. |
| 4. The earth, in the solar system | Cosmology. |
| 5. The earth's structure | Geology. |
| 6. The features of the earth's surface. | Physiography. |
| 7. The atmosphere and its phenomena. | Meteorology. |
| 8. Effects of man upon the earth's surface, and of climate, physical features, &c., on man. | Man and nature. |
| 9. Apportionment and nomenclature of the earth's surface. | Geography. |
| 10. Exploration of the earth | Voyages and travels. |
| III.—NATURAL RESOURCES. | FORCE AND MATTER. |
| 11. Force in its manifestations | Physics, mechanics, and physiology. |
| 12. The elements and their combinations. | Chemical collections. |
| 13. Inorganic matter | Mineralogical collections. |
| 14. The vegetable kingdom | Botanical collections. |
| 15. The animal kingdom | Zoological collections. |
| IV.—THE EXPLOITATIVE INDUSTRIES. | EXPLOITATIVE TECHNOLOGY. |
| *Primary.* | |
| 16. Exploitation of inorganic materials. | Mining and quarrying. |

| | |
|---|---|
| 17. Exploitation of vegetable products of spontaneous growth. | Lumbering and field-gleaning. |
| 18. Capture of animals | Hunting, fishing, &c. |
| *Secondary.* | |
| 19. Culture of plants | Agriculture, horticulture and forestry. |
| 20. Culture of animals: domestic animals and their uses. | Pecudiculture. |

## V.—THE ELABORATIVE INDUSTRIES.—ELABORATIVE TECHNOLOGY.

21. Preparation of food-stuffs, narcotics, &c.
22. Distillation, manufacture of perfumeries, &c.
23. Oils, fats, soaps, and waxes; their preparation and use.
24. Gums, resins, glues, and cements.
25. Pigments and dyes; painting, staining, polishing, bleaching, &c.
26. The chemical manufactures and their products.
27. Feathers, hair, bristles, and their use.
28. Furs and leathers; tanning and currying.
29. Fibers, cordage, textile fabrics, needlework, basket-work.
30. Paper and its manufacture; book-making; stationery.
31. Hard and flexible organic tissues and their use.
32. Woods, and the wood-working industries.
33. Stones, and the stone-working industries; masonry.
34. Metals, metallurgy, and the metal industries.
35. Glass and enamel and their fabrication.
36. Pottery, and the ceramic industry.
37. Tools, machinery, and motors, their manufacture and use.
38. Construction, architecture, and civil engineering.

## VI.—ULTIMATE PRODUCTS AND THEIR UTILIZATION.

39. Foods and drinks: preparation, cookery, &c.
40. Narcotics and masticatories; pipes, &c.
41. Dress, and personal adornment.
42. Buildings, villages, and cities.
43. Furniture, house interiors, domestic economy, &c.
44. Heating and illumination.
45. Medicine, surgery, pharmacology, hygiene, &c.
46. Public comfort, recreation, protection and rescue.
47. Transportation by land and water: appliances and accessories.

## VII.—SOCIAL RELATIONS OF MANKIND. SOCIOLOGY AND ITS ACCESSORIES.

48. The vocations of men.
49. Communication of ideas and their record: writing and printing, telegraphy, signals, &c.

50. Trade and commerce.
51. Societies and federations, social, beneficial, religious, and political.
52. Government and law.
53. War (including armor and weapons).
54. Festivals, ceremonies, usages, memorials, &c.

## VIII.—INTELLECTUAL OCCUPATIONS OF MANKIND. ART, SCIENCE, AND PHILOSOPHY.

55. Games and amusements.
56. Music and musical instruments.
57. The drama and the stage.
58. The pictorial, plastic, and decorative arts.
59. Literature (from the intellectual standpoint only).
60. Folk lore, traditions, and superstitions.
61. Science: (Research and record.) Scientific instruments.
62. Philosophy, religious, metaphysical, and cosmical.
63. Education and reform; schools, museums, libraries, &c.
64. Climaxes of human achievement.

[Proceedings United States National Museum, 1881, Appendix.]

# SMITHSONIAN INSTITUTION.

## UNITED STATES NATIONAL MUSEUM.

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No. 14.

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### CIRCULAR REQUESTING MATERIAL FOR THE LIBRARY.

The Smithsonian Institution solicits for the library of the United States National Museum, under its charge, copies of publications relating to all departments of anthropology, art, technology, zoology, botany, geology, mineralogy and lithology, geography and explorations, the reports and catalogues of societies, museums, and zoological gardens, as well as copies of plans and labels and other accessories of work in museums, and the catalogues of colleges and schools containing reference to courses of instruction or collections in natural history.

Authors' editions, or "separates" of communications published in periodicals, or proceedings of societies, are especially desired; and it is hoped that authors will furnish, as far as possible, sets of their publications complete to date.

The Smithsonian Institution offers in exchange an equivalent in copies of the proceedings and bulletins of the National Museum, a catalogue of which, complete to date, accompanies this circular; also such of its reports and other publications as can be supplied at the time of application.

The Smithsonian Institution is pleased to receive from investigators in special departments, and from public museums and institutions of learning, applications for such specimens of natural history as are found in North America.

SPENCER F. BAIRD,
*Secretary of Smithsonian Institution and*
*Director U. S. National Museum.*

CITY OF WASHINGTON, UNITED STATES OF AMERICA,
*April* 15, 1882.

Packages of small size may be sent by express, charges to be collected on delivery, and larger packages by freight.

Packages may also be sent from points in the vicinity of military posts by addressing them to "*U. S. National Museum, care of Depot Quartermaster* (stating name of post)," the quartermaster having instructions to forward all such packages.

On the Pacific slope, packages may also be sent in care of the Alaska Commercial Company, San Francisco.

Foreign packages intended for the Museum may be sent by mail, addressed to the Smithsonian Institution, Washington, D. C., or, if of large size, through the following agents of the Smithsonian Institution:

Algeria: Commission Française des Échanges Internationaux, Paris.
Australia: See New South Wales, New Zealand, Queensland, South Australia, Tasmania, and Victoria.
Austro-Hungary: Dr. Felix Flügel, 49 Sidonien Strasse, Leipzig.
Belgium: Commission Belge d'Échange Internationaux, Brussels.
Brazil: Instituto Historico, Geographico y Ethnographico, Rio Janeiro.
Chile: Universidad, Santiago.
China: U. S. Consul-General, Shanghai.
Cuba: Prof. F. Poey (R. University), Calle San Nicolas 96, Havana.
Denmark: Kongelige Danske Videnskabernes Selscab, Copenhagen.
France: Commission Française des Échanges Internationaux, Paris, or Leopold Bassange, Rue.
Germany: Dr. Felix Flügel, 49 Sidonien Strasse, Leipzig.
Great Britain: William Wesley, 28 Essex street, Strand, London.
Greece: By mail direct.
Hayti: Sécrétaire de l'Etat des Relations Extérieures, Port-au-Prince.
Holland: See Netherlands.
India: William Wesley, London.
Italy: Biblioteca Nazionale Vittorio Emanuele, Rome.
Java: Genootschap van Kunsten en Wetenschappen, Batavia.
Mauritius: William Wesley, London.
Mexico, Museo Nacional, Mexico.
Netherlands: Bureau Scientifique, Professor von Baumhauer, Harlem.
New South Wales: Royal Society of New South Wales, Sydney.
New Zealand: Parliamentary Library, Wellington.
Norway: Kongelige Norske Frederiks Universitet, Christiania.
Portugal: Escola Polytechnica, Lisbon.
Queensland: Government Meteorological Observatory, Brisbane.
Russia: Commission Russe des Échanges Internationaux, St. Petersburg.
South Australia: Astronomical Observatory, Adelaide.
Spain: Real Academia de Ciencias, Madrid.
Sweden: Kongliga Svenska Vetenskaps Akademien, Stockholm.
Switzerland: Bundes Canzlei, Berne.
Syria: By mail direct.
Tasmania: Royal Society of Tasmania, Hobarton.
Turkey: By mail direct.
Venezuela: Universidad [Dr. A. Ernst], Caracas.
Victoria: Public Library, Melbourne.
West Indies: By mail direct.

If sent from seaport towns by vessel to New York, packages may be directed to Smithsonian Institution, care of Collector of Customs, port of New York.

## INSTITUTION SMITHSONIENNE. MUSÉE NATIONAL DES ETATS-UNIS.

L'Institution Smithsonienne désire avoir en sa possession pour la Bibliothèque du Musée National des Etats-Unis, placée sous sa direction, des copies de publications relatives à tous les départements anthropologie, art, technologie, zoologie, botanique, géologie, minéralogie et lithologie, géographie et explorations; des rapports et catalogues de sociétés, musées et jardins zoologiques; comme aussi des plans, étiquettes et autres accessoires dont on se sert dans les musées; enfin, les catalogues de colléges et d'écoles, contenant les programmes des cours relatifs à l'enseignement des sciences naturelles ou aux collections qui s'y rapportent.

Des tirages séparés de publications dans des ouvrages périodiques ou des procès-verbaux de sociétés sont particulièrement désirables; et il est à espérer que, autant que la chose est possible, les auteurs présenteront des séries de leurs publications au complet.

En échange ou comme équivalent, l'Institution Smithsonienne offre des copies des procès-verbaux et bulletins du Musée National, dont un catalogue complet jusqu'à cette date accompagne cette circulaire; de même que ceux de ses rapports et autres publications qui pourront être fournies à l'époque de la demande.

L'Institution Smithsonienne recevera de la part d'investigateurs dans les départements spéciaux, de musées et d'institutions scientifiques, les demandes qu'ils pourront avoir à lui adresser afin d'obtenir des specimens d'histoire naturelle qui se trouvent dans l'Amérique du Nord.

SPENCER F. BAIRD,
*Secrétaire de l'Institution Smithsonienne et*
*Directeur du Musée National des Etats-Unis.*

WASHINGTON, DISTRICT DE COLOMBIE,
ETATS-UNIS D'AMÉRIQUE,
15 *Avril*, 1882.

[Proceedings United States National Museum, 1881. Appendix.]

# SMITHSONIAN INSTITUTION.

## UNITED STATES NATIONAL MUSEUM.

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## No. 15.

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## THE ORGANIZATION AND OBJECTS OF THE NATIONAL MUSEUM.

### I.

FOUNDATION AND LEGAL STATUS. THE NATIONAL MUSEUM was organized in 1846 by the act of Congress transferring to the SMITHSONIAN INSTITUTION the custody of the "National Cabinet of Curiosities," at that time deposited in the Patent-Office Building.* These collections were, in 1857, placed in the Smithsonian building, the Regents of the Institution having accepted the trust on condition that the necessary appropriations for their maintenance should be continued by Congress.

The act above referred to provides that "all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging or hereafter to belong to the United States, which may be in the city of Washington," shall be delivered to the Regents of the Smithsonian Institution, and, together with new specimens obtained by exchange, donation, or otherwise, shall be so arranged and classified as best to facilitate their examination and study.†

The National Museum is the authorized place of deposit for all objects of natural history, mineralogy, geology, archæology, ethnology, &c., belonging to the United States or collected by the Coast and Interior Survey, the Geological Survey, or by any other parties for the Government of the United States, when no longer needed for investigations in progress.‡

### II.

ORGANIZATION AND GOVERNMENT. The establishment of the Smithsonian Institution, to which, in addition to the carrying out of the other requirements of the bequest of Smithson, is intrusted the control of the National Museum, is composed of the President of the United States and his Cabinet, the Commissioner of Patents, and a BOARD OF REGENTS, which has for its members the Vice-President and Chief Justice of the United States, three members of the Senate, three members of the House of Representatives, and six other persons, not members of Congress, two of whom are residents of the city of Washington.§

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*AN ACT to establish the "Smithsonian Institution" for the increase and diffusion of useful knowledge among men. (Approved August 10, 1846; Revised Statutes, title lxxiii, sections 5579–5594.)

† Revised Statutes, section 5586.

‡ Statutes Forty-fifth Congress, third session, chap. 182, p. 394.

The management of the National Museum is intrusted to the Secretary of the Smithsonian Institution, who is, *ex-officio*, its director. He is aided by a staff of assistants, who are chosen by him, and for whose action he is responsible to the Regents.

This staff is at the present time composed of an assistant director, six curators, six honorary curators, serving without pay, a number of assistants and aids, acting in various capacities, a registrar, chief taxidermist and chief modeler, besides a considerable force of preparators, mechanics, watchmen, clerks, laborers, &c.

The staff is constantly changing with the varying needs of the Museum.

The operations of the Museum are carried on by means of an appropriation annually made by Congress "for the care and preservation of the collections."*

The collections are stored and exhibited in the building erected for the use of the Smithsonian Institution between 1847 and 1857, and in the new building, just finished, known as the "National Museum."

## III.

COMPOSITION OF THE COLLECTIONS.

The Museum is made up, in large part, of the following materials:

1. The natural-history and anthropological collections accumulated since 1850 by the efforts of the officers and correspondents of the Smithsonian Institution.

2. The collections of the Wilkes Exploring Expedition, the Perry Expedition to Japan, and other naval expeditions.

3. The collections of the scientific officers of the Pacific Railroad Survey, the Mexican Boundary Survey, and of the surveys carried on by the Engineer Corps of the Army.

4. The collections of the United States Geological Surveys under the direction of the United States Geologists Hayden, King, and Powell.

5. The collections of the United States Fish Commission.

6. The gifts by foreign governments to the Museum or to the President and other public officers of the United States, who are forbidden by law to receive them personally.

7. The collections made by the United States to illustrate the animal and mineral resources, the fisheries, and the ethnology of the native races of the country, on the occasion of the International Exhibition at Philadelphia in 1876, and the fishery collections displayed by the United States in the International Fishery Exhibition at Berlin in 1880.

8. The collections given by the governments of the several foreign nations, thirty in number, which participated in the exhibition at Philadelphia.

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* Revised Statutes, 5580.

9. The industrial collections given by numerous manufacturing and commercial houses of Europe and America, at the time of the Philadelphia Exhibition and subsequently.

10. The material received, in exchange for duplicate specimens, from the museums of Europe, Asia, and Australasia, and from numerous institutions and collectors in North and South America.

## IV.

ADJUNCTS TO ADMINISTRATION.

As necessary adjuncts to the work of the Museum, a working library, a chemical laboratory, a photographic establishment, a workshop for taxidermy, modeling, and the preparation of skeletons, and several smaller workshops are carried on as a part of the general work of administration.

## V.

PUBLICATIONS OF THE MUSEUM.

The scientific results of the labors of the officers of the Museum, and of investigations upon the collections belonging to it, are to be found for the most part in the following works:

*Bulletin of the United States National Museum;*
*Proceedings of the United States National Museum;*
*Reports of the Smithsonian Institution;*
*Smithsonian Miscellaneous Collections;*
*Smithsonian Contributions to Knowledge;*
*Reports of the Bureau of Ethnology of the Smithsonian Institution;*
*Reports of the United States Commissioner of Fisheries;*
*Bulletin of the United States Fish Commission;*

also occasionally in other scientific reports of other scientific departments of the government.

## VI.

OBJECTS AND METHODS OF WORK.

The collections in the National Museum are intended to exhibit the natural and industrial resources, primarily of the United States, and secondarily of those of the remainder of the world, for purposes of comparison.

The activity of the Museum is exerted in three directions:

(*a*) The permanent preservation of objects already in its possession.

(*b*) The acquisition of new material.

(*c*) The utilization of material already in its possession, by its exhibition in the most instructive manner, and by the prosecution of and publication of scientific researches for which it forms the basis; by the distribution of properly-labeled duplicates of materials to colleges and other educational institutions.

The preservation of material is accomplished by means of the vigilance of the curators and the skill of the preparators.

New material is acquired (*a*) in accordance with law, from the various government surveys and expeditions; (*b*) by gift from individuals, from other institutions, and from foreign governments; (*c*) by exchange for its duplicate specimens or publications; (*d*) by the efforts of officers of the Museum, who make collections in connection with their regular duties, or are detailed for special service of this nature; (*e*) by purchase when appropriations are made by Congress for that purpose.

The treasures in the custody of the Museum are utilized to the world by exhibiting them to the public, and by encouraging investigations on the part of the officers of the Museum and other suitable persons, and facilitating the publication of the results; also by the distribution to other museums and educational institutions of duplicate specimens, which have formed the basis of scientific investigation, these being identified and labeled by the best authorities.

## VII.

The Museum by these means fulfills a threefold function:

1. It is a *Museum of Record*, in which are preserved the material foundations of an enormous amount of scientific knowledge—the types of numerous past investigations. This is especially the case with those materials which have served as a foundation for the reports upon the resources of the United States. Types of investigations made outside of the Museum are also incorporated.

2. It is a *Museum of Research*, by reason of the policy which aims to make its contents serve as fully as possible as a stimulus to and a foundation for the studies of scientific investigators. Research is necessary in order to identify and group the objects in the most philosophical and instructive relations. Its officers are selected for their ability as investigators, as well as for their trustworthiness and abilities as custodians, and its treasures are open to the use of any honest student.

3. It is an *Educational Museum* of the broadest type, by reason of its policy of illustrating by specimens every kind of natural object and every manifestation of human thought and activity, by displaying descriptive labels adapted to the popular mind, and by its policy of distributing its publications and its named series of duplicates.

[Proceedings United States National Museum, 1881. Appendix.]

# SMITHSONIAN INSTITUTION.

# UNITED STATES NATIONAL MUSEUM.

## No. 16.

## PLANS FOR THE INSTALLATION OF COLLECTIONS.

The collections in the National Museum are now being assorted and rearranged, for the purpose of placing on exhibition a selected series of objects which shall be of interest to visitors, and of making the remainder serviceable for purposes of scientific and technological investigation. A large portion of the most interesting material has never yet been exhibited on account of lack of space.

The following general principles have been adopted in this work:

1. No object will be placed on exhibition which is not of evident educational value, and likely to interest and instruct a considerable percentage of the persons visiting the Museum.

2. The exhibition of duplicate material is to be avoided, except in instances where similar objects can be shown to advantage in different divisions of the Museum.

3. Each object will be placed in a case of the form best suited for its effective display, and the light, color of the background, &c., will be so adjusted as to show it to best possible advantage, and with the least possible fatigue to the eyes of the visitor.

4. Each object, or group of objects, will be accompanied by a large plainly printed label, which will give a concise description of what is shown, an account of its origin and uses, a synopsis of its history, and the name of the person or organization contributing it to the Museum. The character of the Museum is such that any labels which might suggest advertising for business purposes must be excluded. It will be the policy of the Museum, however, to give prominence on each label to the name of the person or business house from whom it has been received, provided that the object is a gift to the Museum.

5. The objects will be grouped together in systematic order, and each case will be provided with a general descriptive label. In the case of collective exhibits, the general label may also give the name of the contributor.

6. The specimens will be illustrated and supplemented by pictures, diagrams, books, and maps, in such manner that the Museum may form an encyclopedia, the illustrations for which are in the exhibition cases, the text in the labels.

7. Guide-book manuals of the different departments will be published, which will embody in concise and systematic form the information given by the specimen labels, together with such illustrative material as may seem necessary to present in addition.

[Proceedings United States National Museum, 1881. Appendix.]

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 17.

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## CONTRIBUTIONS AND THEIR ACKNOWLEDGMENT.

No money having at any time been specially appropriated for increasing the collections by purchase, the growth of the Museum has ever been and still is dependent solely upon the exertions of its officers and those of other branches of the public service and upon the public spirit and liberality of its friends.

The friends of the Smithsonian Institution and the National Museum are earnestly invited to take part in the work of building up the collections and in particular to respond to special requests for advice or other aid which may reach them by letter.

The following rules for the acknowledgment of specimens will be adhered to:

1. Each contribution will be recognized by a formal written acknowledgment from the Director.

2. Each contribution will be published in the annual reports of the Smithsonian Institution and the National Museum; and in the catalogues and other publications of these establishments in which the objects contributed may be alluded to, the name of the contributor will always be given.

3. On the label, which is invariably attached to every object, the name of the contributor will be conspicuously printed. In the case of donations the form will be "Gift of ——— ———," and where the objects have been obtained by special exertions of a friend of the Museum, who, however, is not their donor, the form will be "Obtained by ——— ———," or "Collected by ——— ———."

4. Objects which may have been bought by special appropriations, such as those for the Philadelphia and Berlin exhibitions, will not be labeled with the name of the persons from whom purchased, except by special agreement in cases where these persons have been only in part paid for their exertions.

5. The Museum will make every possible return for aid rendered, by offering in exchange its publications and its duplicate specimens.

[Proceedings of U. S. National Museum, 1881. Appendix.]

# SMITHSONIAN INSTITUTION.

## UNITED STATES NATIONAL MUSEUM.

## No. 18.

## LIST OF PUBLICATIONS OF THE UNITED STATES NATIONAL MUSEUM.

### A.—BULLETINS IN SEPARATE FORM.

*Bulletin* 1.—Check-List of North American Batrachia and Reptilia; with a systematic list of the Higher Groups, and an Essay on Geographical Distribution based on the specimens contained in the United States National Museum. By Edward D. Cope. 1875. 8vo, pp. 4, 104. (1)

*Bulletin* 2.—Contributions to the Natural History of Kerguelen Island, made in connection with the American Transit of Venus Expedition, 1874–'75. By J. H. Kidder, M. D., Passed Assistant Surgeon, United States Navy. I. Ornithology. Edited by Dr. Elliott Coues, United States Army. 1876. 8vo, pp. ix, 1, 51. (2)

*Bulletin* 3.—Contributions to the Natural History of Kerguelen Island, made in connection with the American Transit of Venus Expedition, 1874–'75. By J. H. Kidder, M. D., Passed Assistant Surgeon, United States Navy. II. 1876. 8vo, pp. 2, 122. (3)

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    Pseudo-Neuroptera. By H. A. Hagen.
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Annelids, Echinoderms, and Anthozoa. By A. E. Verrill.
Surgeon E. Kershner's collection.
A Study of Chionis minor. By J. H. Kidder and Elliott Coues.

*Bulletin* 4.—Birds of Southwestern Mexico. Collected by Francis E. Sumichrast for the United States National Museum. Prepared by George N. Lawrence. 1875. 8vo, pp. 56. (4)

*Bulletin* 5.—Catalogue of the Fishes of the Bermudas. Based chiefly upon the collections of the United States National Museum. By G. Brown Goode, Curator United States National Museum. 1876. 8vo, pp. 2, 2 unnumbered, 3–82. (5)

*Bulletin* 6.—Classification of the collection to illustrate the animal resources of the United States. A list of substances derived from the animal kingdom, with synopsis of the useful and injurious animals and a classification of the methods of capture and utilization. By G. Brown Goode, M. A., Assistant Curator United States National Museum. 1876. 8vo, pp. xiii, 126. (6)

*Bulletin* 7.—Contributions to the Natural History of the Hawaiian and Fanning Islands and Lower California, made in connection with the United States North Pacific Surveying Expedition, 1873–'75. By Thos. H. Streets, M. D., Passed Assistant Surgeon United States Navy. 1877. 8vo, pp. 172. (7)

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*Bulletin* 8.—Index to the names which have been applied to the subdivisions of the class Brachiopoda, excluding the Rudistes previous to the year 1877. By W. H. Dall, United States Coast Survey. 1877. 8vo, pp. 88. (8)

*Bulletin* 9.—Contributions to North American Ichthyology, based primarily on the collections of the United States National Museum. I. Review of Rafinesque's Memoirs on North American Fishes. By David S. Jordan. 1877. 8vo, pp. iii, 4–53. (9)

*Bulletin* 10.—Contributions to North American Ichthyology, based primarily on the collections of the United States National Museum. II. A.—Notes on *Cottidæ*, *Etheostomatidæ*, *Percidæ*, *Centrarchidæ*, *Aphododeridæ*, *Dorysomatidæ*, *Cyprinidæ*, with revisions of the genera and descriptions of new or little known species. B.—Synopsis of the *Siluridæ* of the fresh waters of North America. By David S. Jordan. 1877. 8vo, pp. 4, 120, pl. 45. (10)

*Bulletin* 11.—Bibliography of the Fishes of the Pacific coast of the United States. By Theodore Gill. 1882. 8vo, pp. 4, 73. (11)

*Bulletin* 12.—Contributions to North American Ichthyology, based primarily on the collections of the United States National Museum. III. A.—On the distribution of the fishes of the Alleghany region of South Carolina, Georgia, and Tennessee, with descriptions of new or little known species. By David S. Jordan and Alembert W. Brayton. B.—A synopsis of the family Catostomidæ. By David S. Jordan. 1878. 8vo, pp. 237. (12)

*Bulletin* 13.—The Flora of St. Croix and the Virgin Islands. By Baron H. F. A. Eggers. 1879. 8 vo, pp. 6, 133. (13)

*Bulletin* 14.—Catalogue of the collection to illustrate the Animal Resources and the Fisheries of the United States, exhibited at Philadelphia in 1876, by the Smithsonian Institution and the United States Fish Commission, and forming a part of the United States National Museum. Prepared under the direction of G. Brown Goode. 1879. 8vo, pp. xvi, 351. (14)

*Bulletin* 15.—Contributions to the Natural History of Arctic America, made in connection with the Howgate Polar Expedition, 1877-78. By Ludwig Kumlien, Naturalist of the Expedition. 1879. 8vo, pp. 179. (15)

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*Bulletin* 16.—Contributions to North American Ichthyology, based primarily on the collections of the United States National Museum. IV. A Synopsis of the Fishes of North America. By David S. Jordan and Charles H. Gilbert. ——. 8vo, pp. ——. (In press.) (16)

*Bulletin* 17.—On the Zoological position of Texas. By Edward D. Cope. 1880. 8vo, pp. 4, 51. (20)

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*Bulletin* 19.—Nomenclator Zoologicus. An alphabetical list of all generic names that have been employed by naturalists for recent and fossil animals from the earliest times to the close of the year 1879. In two parts. I. Supplemental list. By Samuel H. Scudder. Washington: Government Printing Office, 1882. 8vo, pp. xxi, 1, 376. (22)

*Bulletin* 20.—The writings of American Zoologists. Index Bibliography, No. I. Publications of Spencer Fullerton Baird. By G. Brown Goode. ——. 8vo, pp. ——. (In press.) (23)

*Bulletin* 21.—Nomenclature of North American Birds chiefly contained in the United States National Museum. By Robert Ridgway. 1881. 8vo, pp. 94. (24)

*Bulletin* 22.—Guide to the Flora of Washington and vicinity. By Lester F. Ward, A. M. 1881. 8vo, pp. 264+1, one folded map. (26)

## B.—BULLETINS COMBINED IN VOLUMES.

*Volume I.*—(consisting of Bulletins 1 to 10, each retaining its own pagination). Bulletin of the United States National Museum. Volume I, (Nos. 1–10). Published under the direction of the Smithsonian Institution. Washington: Government Printing Office, 1877. 8vo, pp. 1010. (18)

*Volume II.*—(consisting of numbers 11 to 15, each retaining its own pagination).—Bulletins of the United States National Museum. Volume II, (Nos. 11–15). Published under the direction of the Smithsonian Institution. Washington: Government Printing Office, 1882. 8 vo, pp. 999. (28)

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